



International survey of individual carbon card programmes

Sandrine Rousseaux

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An International Survey of Individual Carbon Card Programmes

July 2010

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Report for ADEME

Convention n°09 10 C 0110

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Economy and Planning Department – ADEME Paris-Vanves

ADEME

The French Environment and Energy Management Agency (ADEME) is an industrial and commercial public agency, under the joint supervision of French Ministries for Ecology, Sustainable Development and Spatial Planning (MEDAD) and for Higher Education and Research. It participates in the implementation of public policy in the domain of the environment, energy, and sustainable development. The Agency makes its expertise and consulting capacities available to companies, local authorities, public authorities, and the general public and helps them finance their projects in five domains (waste management, soil preservation, energy efficiency, renewable energies, air quality and noise control) and progress in their approach towards sustainable development.

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Summary

States, local authorities, industry and individuals must take action to reduce greenhouse gas (GHG) emissions in order to tackle climate change.

Personal emissions are related to residential and transportation energy consumption as well as regular daily consumption (food, clothing, leisure activities, etc.). The modification of current habits and adoption of low carbon behaviours is a prerequisite for emissions reduction. It is within this context that initiatives are being taken to make individuals aware of the environmental impact of their lifestyles and encourage them towards eco-responsibility.

This second survey of international personal carbon card programmes cites new and emerging initiatives that aim to stimulate demand for products and services that respect the environment by introducing individual consumption monitoring. These initiatives cover voluntary programmes established by the public and private sector as well as mandatory programmes that are being considered in the political realm.

Carbon cards are generic concepts that cover mechanisms with different approaches. The programmes listed in this study are classified into four categories: CO₂ emissions accounting and reduction, carbon offsetting, support for sustainable consumption and behaviour, and donations. Only the first three categories aim to make individuals aware of their environmental or carbon impact and demonstrate means for its mitigation. These programmes often include an element of charity not dissimilar from that developed in the donation programmes.

A comparative analysis of the existing voluntary programmes described in this study enables a better understanding of their key objectives, similarities and differences, and implementation procedures. The results of this study show that not all of the programmes are equally effective in changing individual behaviour or reducing CO₂ emissions. Carbon offset programmes do not incite behavioural change. Individuals mitigate part of their emissions by purchasing credits from emissions reduction projects, but the overall quantity of their emissions is not reduced. Programmes that support sustainable consumption and behaviour stimulate purchasing and behaviour that respect the environment. However, individuals are not made aware of the environmental impact of their non-sustainable practices, unaddressed in these programmes. Carbon accounting and reduction programmes, by contrast, have an impact on both environmental and behavioural fronts. This impact results from setting caps on personal emissions, joined occasionally with reward and penalty mechanisms in accordance with individual performance.

The comparative analysis of different existing programmes also provides insights for implementing possible mandatory programmes. Findings show that the foundations are already in place for national personal carbon trading schemes, which are attracting attention in the scientific and political realms, notably in the UK. Further insights into the implementation and operating procedures, technical aspects, and social appropriation of such programmes could be gained with data from previous and on-going experiments.

A “learning by doing” approach could be used by establishing mechanisms for measuring personal emissions and granting rewards for meeting reduction targets. Several existing programmes already follow the principle “save and earn.” They could subsequently evolve into personal carbon trading schemes.

1. Introduction

The exact configuration of the International Climate Change Regime, which is applicable after the 2012 Kyoto Protocol expiration date, is still uncertain. Signatories of the Copenhagen Accord, adopted in December 2009, did however agree on the necessity to limit global warming to 2 or 1.5 Celsius degrees, compared to pre-industrial levels. This ceiling of 2°C was set by the Intergovernmental Panel on Climate Change (IPCC) as the limit not to be exceeded in order to avoid irreversible anthropogenic interference with the climate system (WG II, 2007).

Mitigating current climate disruption requires rapid and consequential reduction in greenhouse gas (GHG) emissions. The following two targets are to be met to contain global temperature increases to about 2°C by the end of the 21st century: carbon dioxide emissions levelling off between 2000 and 2015 and a 50% to 80% reduction in these emissions by 2050 compared to 2000 levels (WG III, 2007).

1.1 The need for a general mobilisation against climate change

Contributions are expected of states, administrations, local authorities, companies and individuals in order to reach both the emissions reduction targets for 2050 and the intermediate targets set for 2020 (see European Parliament and European Council 2009). France, for example, made the commitment, within the framework of the climate and energy package adopted by EU institutions in 2009, to contribute to the 20% reduction in European GHG emissions by 2020 compared to 1990 levels. This contribution translates principally into a 14% reduction from 2005 emission levels from diffuse sources that are not regulated by the European Union Emission Trading System (EU ETS). These diffuse emissions come for the most part from the transportation and building sectors. Other contributors include agriculture and waste management. France has also committed to achieve “Factor 4” in 2050, which means cutting their 1990 emissions by 75%¹.

Climate change mitigation depends on profoundly modifying means of production and consumption as well as creating a new low carbon economy. The efforts that are required have been compared to those undertaken during the American mobilization in World War II (Heinberg 2004; Brown 2008). This monumental job requires a long-term strategy and policies which are much more ambitious than those currently in place (Fox *et al.* 2009). The political, technological and social revolutions that need to occur must be accompanied with lifestyle changes (Radanne 2005).

1.2 Proposals that aim to involve individuals in the fight against climate change

Personal GHG emissions expressed in carbon dioxide equivalent (CO₂e) are insignificant on an isolated individual's level. But collectively, individuals contribute significantly to climate change. GHG emissions are directly linked to consumption and the increase in global population (SCI 2009). Emission levels per inhabitant vary depending on whether emissions produced on the national territory are counted or whether emissions linked to the consumption of a country's population are counted. In both cases, they are higher in developed countries. In France, CO₂ emission levels were 6.7 tonnes per inhabitant when calculating the national economic activity and 9 tonnes when calculating the final domestic demand. Three quarters of France's emissions induced from the final domestic demand are linked to residential consumption, broken down mainly into housing, transport and food. This represents 6.4 tonnes per inhabitant on average (Lenglard *et al.* 2010). Yet taking into account the current world population, the annual emission level per inhabitant should not exceed 0.6 tonnes of carbon in 2050, or 2.2 tonnes of carbon

¹ Bill providing framework for government programme of July 13, 2005 establishing the orientation of the energy policy (JORF July 14th) and the ‘Grenelle I’ law of August 3, 2009 (JORF Aug. 5th).

dioxide, in order to stabilize the atmospheric concentrations of CO₂ to 450 ppm (parts per million) and limit global warming to roughly 2°C (d e Boissieu 2006).

Individuals have an important role to play in climate change mitigation. Not only because their consumption contributes to this global environmental problem, but also because they can encourage innovation and means of production changes through demand for low carbon products and services (SCI 2009).

The necessity for a change in lifestyles and behaviour was brought up for the first time by the IPCC in its last report (WG III, 2007). Individual ecological responsibility is now being actively encouraged.

1.2.1 Objectives of this paper

This paper studies mechanisms for raising individuals' awareness of their environmental impact and encouraging the reduction of this impact. More importantly, the objective of this paper is to describe and analyse new and emerging initiatives that aim to act on the demand level by initiating personal consumption monitoring. Although this paper covers different initiatives on the international level, the focus is on those in France. Both voluntary mechanisms established by the private and public sector and mandatory mechanisms considered in the political sphere figure among those initiatives.

A previous study was performed on this subject for ADEME, the French Environment and Energy Management Agency (Rousseaux 2009). It laid out the international state-of-the-art in different personal carbon card programmes. Findings showed that carbon cards are generic notions that encompass mechanisms which follow different principles. Carbon card programmes refer to personal carbon trading schemes (see below). But this designation is equally employed for other types of mechanisms geared to individuals (carbon offset programmes, and green loyalty programmes that support sustainable consumption and behaviour).

This second international survey shows the rapid development of personal card programmes and personal CO₂ emissions monitoring programmes. A certain attention is placed on personal carbon trading. This scheme has been the object of political proposals, scientific study, and experiments. Programmes based on the principle of personal CO₂ emissions accounting and reduction have also been established, though without provisions for individual carbon budget allocations. Programmes that support sustainable consumption and behaviour are currently more widespread. A certain decline in voluntary carbon offsetting has been observed (two programmes cancelled).

This paper begins by reporting on the political positions taken that favour personal carbon trading before highlighting the challenges of establishing such an instrument. The operating and implementation procedures of existing personal card programmes and personal CO₂ emissions monitoring programmes (including their similarities and differences) are then explained. A comparative analysis of current voluntary programmes provides insights into the possible implementation of mandatory programmes. These insights are presented in the conclusion.

1.2.2 Methodology

The inventory of the different personal carbon card initiatives taken by the public and private sector was performed through document research. This research covers the presentation of existing programmes, political proposals as well as research and reports done on the different initiatives studied. This research was carried out essentially on the Internet. This review was supplemented by interviews, with programme sponsors in particular, in France, UK, Belgium and Germany.

This methodology has its limits, partly due to the fact that the review is maybe not exhaustive and only French and English documents were analysed.

2. A new scheme considered: personal carbon trading

Personal carbon trading is an extension of existing emissions trading schemes. Presently these schemes only apply to states (within the framework of the Kyoto Protocol), or economic activities (in the manner of the EU ETS). An additional degree of decentralization is conceivable by putting into place schemes geared to individuals.

A personal carbon trading scheme is an innovative and relatively radical tool. It is an instrument for controlling personal CO₂ emissions in the sense that it aims for carbon dioxide accounting and reduction. Such schemes are based on the allocation of personal carbon budgets designed to cover individuals' emissions. A budget would consist of carbon credits that were accredited to a personal carbon account. The account is debited according to the carbon content of certain goods or services purchased. Carbon credits could be traded on the carbon market depending on how well individuals manage their carbon budget. The carbon budget could be exceeded on condition that additional credits are bought from people with a surplus. Thus, those whose emissions are lower than the budget would receive financial rewards for their carbon savings.

2.1 A scheme initially proposed by scientists

A Personal Carbon Trading scheme (PCT) can have many forms. It is a generic concept that can include three principle academic proposals:

- Domestic Tradable Quotas (DTQs), or Tradable Energy Quotas (TEQs)
- Personal Carbon Allowances (PCAs)
- Rate All Products and Services (RAPS)

These proposals were initially formulated in the 1990s and were developed further by British researchers in the 2000's: David Fleming (The Lean Economy Connection), Aubrey Meyer (Global Commons Institute), Mayer Hillman and Tina Fawcett (Policy Studies Institute), Richard Starkey and Kevin Anderson (Tyndall Centre for Climate Change Research). These proposals are derived from the more general concept of Contraction and Convergence (C&C) developed by the Global Commons Institute.

Research on personal carbon trading has been continued in the UK. Research has also been carried out in other countries like in Australia, Canada, China, France, Germany, the Netherlands, Sweden and the United States. Study is based primarily on the operational procedures, consistency with existing policy instruments and social appropriation of such programmes.

The different schemes considered operate on the principle of establishing national emissions trading schemes based on mandatory individual participation. Caps would be set on personal CO₂e emissions related with energy consumption, and that quantity would be divided into allocations of authorized emissions for individuals in the form of an allowance made up of carbon credits.

The share of emissions that fall under the responsibility of individuals varies across schemes. Individuals are responsible for emissions associated with residential and transport energy consumption, emissions which are directly attributable to individuals according to the TEQs, DTQs and PCAs proposals. Distinctions are made, however, concerning emissions relating to air travel and public transport, since they fall under the responsibility of individuals in the PCA's, and the responsibility of transport organizations in TEQs and DTQs. Individuals are responsible for all emissions under the RAPS scheme as it operates on the basis of derived emissions attributed to individuals (everyday products and services unrelated to energy use in residential and transport).

Carbon credits are allotted to individuals to cover their emissions. These credits are surrendered according to the carbon content of purchases made. The terms for carbon credit allocation and return vary within different schemes. In all the schemes, economic incentives to stay within the allotted carbon budget come in the form of rewards for credits saved (unused

credits can be sold on the carbon market or saved for subsequent use) and penalties for surplus emissions (credits deficits must be covered by the purchase of additional credits).

Procedures	Scope	Carbon credit allocation	Carbon credit return
Schemes			
TEQs or DTQs	Participants : individuals (residential and personal transport energy consumption) and organizations (industry, hospitals, local authorities, government) Percentage of emissions covered: 100%	Free for individuals Auctions for organizations	To the authority in charge of their allocation, through energy producers and suppliers (to whom the credits are surrendered by individuals and organizations when they purchase energy)
PCAs	Participants: individuals Percentage of national emissions covered: % relating to residential and personal transport energy consumption (including air travel and public transport)	Free	To the authority in charge of their allocation
RAPS	Participants: individuals Percentage of national emissions covered: 100% (energy consumption for residential, transport and everyday items delivery)	Free	To the authority in charge of their allocation

Establishing a domestic personal carbon trading scheme means defining conditions for articulation with existing emissions trading schemes that apply to other economic agents like the EU ETS. They could be introduced alongside these systems (PCAs), with modifications to their rules (TEQs) or become substitutes (RAPS).

2.2 A scheme gradually considered in the political sphere

Personal carbon trading is gradually being considered in political spheres. Two options are being looked at: national schemes based on mandatory participation of individuals or local experiments of voluntary programmes.

2.2.1 A scheme considered at a national level

Governments and members of political parties in different countries are considering domestic personal carbon trading schemes. Initiated by the UK, thoughts are now being pursued in other countries.

- **The UK: first country to consider personal carbon trading**

Political debates started in 2004 when a draft bill establishing a national personal carbon trading scheme was presented before the House of Commons by Colin Challen, member of the Labour Party, and supported by ten other Members of Parliament (Authority of the House of Commons 2004). "The Domestic Tradable Quotas Act" was inspired by research undertaken at the Tyndall Centre for Climate Change Research. The project planned for the Secretary of State for Environment to set carbon budgets for five years, divided equally among citizens 18 years of age and older. The proportion of emission rights allocated to individuals for each budget year would correspond to a percentage of the total amount of GHG generated by their residential and transportation energy consumption during the first year of implementation. The remainder of the

national carbon budget would be auctioned off to organizations (administrations, local authorities, industry and hospitals). The Secretary of State for Environment would also have jurisdiction over regulating personal CO₂ emissions accounting, issuance of smart cards to individuals for measuring their emissions, carbon units surrendering as well as carbon trading on a market. The draft bill was introduced as a private proposal. This type of initiative allows for 10-minute debates in the House of Commons.

In 2005, Elliot Morley, Secretary of State for Environment, Food and Rural Affairs, indicated in an interview before the G8 summit in Gleneagles that it was time to “think the unthinkable.” He considered that personal carbon trading was an intellectually attractive idea (BBC News 2005).

In 2006, personal carbon trading became a part of the British government’s agenda.

- The Energy Review Report presented to Parliament by the Department of Trade and Industry (DTI) has a chapter devoted to energy saving, mentioning that new political options deployable on a local level such as personal carbon trading, would be examined (DTI 2006). Four departments were to be involved in studying the question: DCLG (Department of Communities and Local Government), Defra (environment), DTI (industry) and HM Treasury (economy and finance).
- David Miliband, Secretary of State for Environment, stated in a speech in front of the Audit Commission that he believed it necessary to consider new and radical options such as personal carbon trading. He confirmed that a joint study of this policy instrument would be carried out by four departments. The scheme would apply only to individuals’ direct emissions (residential and personal transport energy consumption including air travel), in order to reduce its complexity. Miliband called for a nation-wide debate and for a coalition to be formed on this issue. He also launched the research and development project *CarbonLimited* (see annex 1.3).

“Imagine a country where carbon becomes a new currency. We carry bank cards that store both pounds and carbon points. When we buy electricity, gas and fuel, we use our carbon points, as well as pounds. To help reduce carbon emissions, the Government would set limits on the amount of carbon that could be used” (Miliband 2006)

- Defra (Department for Environment, Food and Rural Affairs) requested the Centre for Sustainable Energy to undertake a study on the concept of Personal Carbon Trading.

Personal carbon trading was adopted that year by the Green party in Scotland.

In 2007 the government decided to perform a pre-feasibility study in an attempt to gain a better understanding of the questions surrounding personal carbon trading. This study was in line with work mentioned in the previous year’s Energy Review Report. It aimed to identify the potential advantages of this policy instrument over other approaches. The fields of investigation were defined in the report presented to Defra by the Centre for Sustainable Energy (Roberts *et al.* 2006): potential effectiveness and strategic framework, public acceptability, technical feasibility and potential cost. An inter-departmental committee was established to supervise the study. The analysis was primarily based on a DTQ scheme applicable to the national economy (40% of emissions are allocated to individuals free of charge, the remaining 60% are distributed to organizations through auctions on a primary market). A PCA scheme, applying only to individuals, was sometimes considered. In both cases individuals would be responsible for the CO₂ emissions related to energy use for their homes and their domestic and international transport. For research needs, the postulate was that a personal carbon trading scheme would be introduced between 2013 and 2020.

Personal carbon trading was the subject of discussions during the review of the Climate Change Act in 2007. A motion in its favour was put forward by Colin Challen, author of the draft bill presented in 2004, a couple of weeks before the law’s review (Wyatt 2007). Support was given by MPs from the country’s main political parties. London mayor Ken Livingston also called on the government to reinforce the draft bill so that it would include personal carbon trading (MayorWatch 2007). The government clarified that the objective of the pre-feasibility study

would be to explore the potential contribution of the scheme. Its implementation would need a specific law. Provisions of the new climate change law would not be used to put a personal carbon trading scheme into place. Hilary Benn, successor to David Miliband, considered though that a proposal for individual carbon budgets would be a good idea in the longer term (Benn 2007).

In 2008 the conclusions of the pre-feasibility study on personal carbon trading were published. The study contained four reports on the pre-defined fields of investigation: potential effectiveness and strategic framework, distribution impacts, public acceptability, technical feasibility and potential costs (Defra 2008a; Thumin *et al.* 2008; Owen *et al.* 2008; Lane *et al.* 2008). The main results are mentioned in the following section along with the principle characteristics of a personal carbon trading scheme.

In the synthesis report (Defra 2008b), the government observed the following concerning this public policy initiative: considerable potential to get individuals involved in the fight against climate change, fiscally progressive aspect, possible mitigation of eventual impacts on low-income households and rural populations, absence of technical barriers to the scheme's implementation. However, the costs of putting the scheme into place were significant. More generally, the government considered that the idea was too far ahead of its time, as much in terms of public acceptability as in the technology to reduce its cost. The government remained interested in the concept but decided not to continue research on the matter at that time.

One month after Defra's publication of the results of the pre-feasibility study, the House of Commons Environmental Audit Committee published a report on the subject (House of Commons 2008). The committee shared the preoccupations of the government regarding both the reticence of public opinion concerning personal carbon trading and the incurring costs. The committee regretted however that research on the question was not continued and called on the government to seriously and quickly evaluate means of taking the question further. It mentioned that a personal carbon trading scheme needed to be considered as a real policy option, necessary in order to favour individual behaviour changes and involve individuals in reaching the emissions reduction targets set by the government for 2050. This scheme was considered to be both more effective in terms of inciting individual behaviour change and more fiscally progressive than a carbon tax. Its implementation could be facilitated by calling on the expertise and infrastructure of the private sector. In addition, provisions of the climate change law constitute an appropriate framework for its introduction on a national level. The committee underlined that as the policy landscape was already crowded, the most realistic option was to introduce a scheme that would cover individuals' direct emissions (energy consumption for housing and personal transport including air travel), even though a system covering the whole economy (TEQs and DTQs) was attractive. Any double counting of emissions that would result from an overlap with the EU ETS would not pose a significant problem as the national carbon currency would be different from the European carbon currency and the respective effectiveness of the two schemes would not be reduced.

In a response to the Environmental Audit Committee report, published in November 2008, the government stated that a personal carbon trading scheme would not be introduced without a vast political commitment and public debate (House of Commons 2008). The scheme was perceived as complex and tedious by public opinion, and certain reserves were voiced concerning its fairness. Research showed that it would be fiscally progressive, since higher income households consume more energy than lower income households. Introducing personal carbon trading would entail high costs, although its potential for changing behaviour was uncertain, and a double counting of emissions because of an overlap with the EU ETS. The main benefit would be raising the visibility of personal emissions, which could induce behaviour changes. The government reiterated the necessity of exploring alternative tools capable of providing the same results and mentioned in particular the role of the Act On CO₂ campaign (personal carbon calculator). Data collected from personal carbon trading simulations or voluntary experiences within pilot projects could prove insightful.

Despite the position adopted by the government, Ed Miliband, Secretary of State for Energy and Climate Change, declared himself favourable to the idea of personal carbon trading (Wintour *et al.* 2008).

In 2009 there was a debate in the House of Commons on personal carbon trading based on the Environmental Audit Committee's report and the government's response published the previous year (Parliament 2009). Running pilot projects in different parts of the country was mentioned. An internal consultation within the Liberal Democrat Party was launched. Simon Hughes, president of the party, considered that it was a fundamentally good proposal and that it was time to open up to new ideas and find new solutions to the crisis (Hughes 2009). A joint report of the All Party Parliamentary Group on Peak Oil and Gas and the Lean Economy Connection showed interest for implementing a cap and trade scheme covering the national economy (TEQs) to face both the petrol depletion and climate change (APPGPO *et al.* 2009). Lord Smith, Chief of the Environment Agency, considered that personal carbon trading (PCAs) was one of the measures that should be developed within the next 20 years (Environment Agency 2009).

▪ The consideration of personal carbon trading in other countries

In **Belgium**, the implementation of an individual carbon card was proposed during the 2009 regional elections by the green party Ecolo and the Humanist Democratic Centre party (CDH). The goal was to sensitize consumers to the CO₂ content of their purchases and allow them to set emissions reduction targets. Voluntary participation in the scheme was considered. According to a survey done in 2007 by Dedicated research, more than half of the people questioned were favorable to a family carbon allowances scheme, even if doubts were raised concerning its practical feasibility (Schoune 2007).

In **Finland**, experiments with personal carbon trading have been considered (Prime Minister's office 2009). A test in stages is suggested, by starting with voluntary and local systems. Direct emissions related to electricity, heat, transport fuels and flying would be initially covered, as they are the easiest to measure.

In **France**, different members of the main political parties pronounced themselves in favour of introducing a personal carbon trading scheme. Yves Cochet, deputy of the Green Party, proposed to allocate individual allowances for food and energy consumption (Cochet 2005). Dominique Voynet, from the same party, Dominique Perben, former UMP minister, Fabienne Keller, UMP senator, and Francis Lalanne from the Alliance Ecologiste Independante equally evoked the possibility for each individual to be allocated a carbon allowance (Courrier de la Planete 2004; L'Express 2006; Keller 2009; Communiqué de Presse 2009). The implementation of an individual carbon credit card scheme and an individual carbon account figured among the measures proposed by Corinne Lepage, Cap 21 and Francois Bayrou, MoDem party, in the run up to the presidential elections in 2007 (Usine Nouvelle 2006; Bayrou 2006).

In **Switzerland**, the 2000 Watt Society concept, developed by the Swiss Federal Institute of Technology of Zurich, received the support of Moritz Leuenberger, chief of the Federal Department of Environment, Transport, Energy and Communications (Novatlantis 2005). This concept aims to bring energy consumption per habitant (household, transportation, work and leisure) down to 2000 watts, the global average, within a couple of decades. The current energy consumption per habitant in Switzerland is 2.5 times higher, and in Europe 3.5 times higher, than the global average.

In **Australia**, two figures of the Labour Party, Bob Carr, former Prime Minister, and John Thwaites, former deputy Prime Minister and Minister for Environment, Water, and Climate Change pronounced themselves in favour of personal carbon trading in 2007 (Frew 2007; Spratt 2007).

In the **United States**, certain political figures are considering personal carbon trading even if it is not publicly evoked. Nancy Pelosi, president of the House of Representatives, mentioned during a trip to China, that every aspect of everyone's lifestyle should be subjected to an inventory (Ang 2009).

Finally, in **China** the debates on personal carbon trading that were conducted in the United Kingdom within the House of Commons appear on the government's information website on climate change (China Climate Change Info 2008). An action plan aiming at encouraging the country's citizens to reduce their emissions by adopting low carbon lifestyles was launched in 2009 by the Ministry for Environment. The purpose of this one-year action plan is to count the

carbon emissions of more than 300 families among 11 pilot cities, before to be expanded at the national level (China Climate Change Info 2009).

2.2.2. A scheme considered on the international level

▪ European Union:

The idea of personal carbon trading has been studied within different EU institutions. The focus has been on either a cap and trade scheme that would cover the whole European economy, or the inclusion of the road transport sector in the EU ETS.

- GHG emissions trading system covering the whole European economy:

The European Parliament considered it was necessary for citizens to participate more closely with the efforts undertaken by the EU to reduce GHG emissions and promote more viable lifestyles (European Parliament 2005). It underlined that a preliminary condition was the diffusion of information concerning the carbon content of goods and services, and that an option for the future would be a personal carbon trading scheme. The European Parliament requested the Commission to study the benefits of the scheme, and the possibility of its establishment to influence personal consumption habits. This request was reiterated three years later within the Citizens' Agora (European Parliament 2008).

Mr Struan Stevenson, member of the Conservative Party in Scotland and European deputy, announced several times that he was in favour of an emissions trading scheme that would cover the whole European economy. He suggested introducing a DTQ scheme (Domestic Tradable Quotas) within the EU, during the discussions on the European Commission Green Paper on a common energy policy and more recently during the United Nations Conference on Climate Change in Copenhagen (Stevenson 2006, 2009). This possibility was also considered during the Finnish presidency of the EU by the Minister of the Environment Mr. Jan-Erik Enestam (2006). Regulating personal carbon emissions (residential and transport, including air travel) by a mandatory scheme applying to individuals might have been on the agenda of a 2005 environmental strategy committee meeting attended by the EU Commission and the United States government (Stevenson 2005).

- Inclusion of the road transport sector in the EU ETS:

In 2006, Mr. Günter Verheugen, then Vice President of the EU Commission and European Commissioner for Enterprise and Industry, addressed a letter to President Barroso proposing to include car drivers in the EU ETS. He considered that the proliferation of schemes should be avoided, which implies expanding the EU ETS to the transport sector (Castle 2006).

In a 2008 working document accompanying the proposal for a directive to improve and extend the EU ETS, the European Commission considered the possibility of integrating vehicle owners into the system (European Commission 2007). It was underlined that this option conformed to the "polluter pays" principle and was compatible with the application of the EU ETS to direct emissions, and that emissions associated with the purchase of fuel in petrol stations may be easily monitored. However the extension of the EU ETS to the road transport sector implies high transaction costs, due to the IT systems required and administrative costs. The alternative to this downstream approach is an upstream approach where fuel distributors are responsible for the emissions associated to fuel sale and must hold allowances to cover them. This second option would mean a change in the conception of the EU ETS. The European Commission considered that it was too early to pronounce on either option to include road transport in the EU ETS.

▪ ASEAN

Personal carbon quotas were evoked during a regional climate conference organized in 2007 by Malaysia in conjunction with the British government, in view of the preparation of participating countries (Singapore, Thailand, the Philippines, Vietnam, and Laos) for the United Nations

Conference on climate change in Bali. This instrument was presented as an element of a global climate agreement (Prime Minister's office 2007).

- **United Nations Environment Programme**

A guide on climate neutrality drawn up by the United Nations Environment Programme underlines that the concepts of personal carbon trading and carbon labelling will certainly receive further attention in the future (UNEP 2008).

- **International Energy Agency**

Two papers on personal carbon trading were presented during a workshop organized in 2008 by the International Energy Agency. One deals with its effect on the reduction of energy demand, the other looks at its consistency with the EU ETS (Parag, Brohé 2008).

2.2.3 A scheme considered by community networks

Many international networks of communities and local authorities consider personal carbon trading. How cities and communities might be adapted and reconfigured through its introduction on a national level, and its practical implementation on a local level, are being looked at.

- **Transition Network**

Transition initiatives are responses by communities (cities, towns, universities, etc.) to the pressure of climate change, fossil fuel depletion and the economic recession.

The first initiative was launched in 2006 in the town of Totnes, in the south of England. One of the residents of this transition town is Rob Hopkins, professor, co-founder of the Transition Network and author of the Transition Handbook published in 2008. The Transition Network has developed throughout the world. 313 official initiatives were listed in June 2010, 168 of which were in the UK.

The transition initiatives include four stages: community awareness programme, setting up steering groups on sustainable lifestyles (food, transportation, energy, housing, clothing, education, etc.), developing a 20 year energy descent action plan that includes a coordinated ensemble of projects, implementing this action plan and sharing the successes or failures encountered with other initiatives.

Most of the transition initiatives are in the second stage. Totnes' Energy Descent Action Plan was in development from 2008 and was launched in 2010. These plans should give opportunities for building economies that are resilient in the areas of energy and climate, and make it possible to live in a society where a cap and trade scheme that covers the national economy is established.

<http://www.transitionnetwork.org/>

- **METREX**

METREX is a network of European regions and metropolitan areas. Its headquarters are in Glasgow, Scotland. It has been initiating and coordinating research on the theme of "Climate change and urban areas" since 2005. Political, technical and technological measures that allow new configurations for cities within the framework of reducing European GHG emissions by 80% in 2050 are proposed. The introduction of national personal carbon trading schemes appears among these measures.

METREX initiated in 2007 the EU CO₂ 80/50 project with the Region of Hamburg, the lead partner. The objectives of this project, which brings together 20 metropolitan regions including

Ile de France, are the following: produce GHG emissions inventories using a common methodology (the GRIP model - GHG Regional Inventory Protocol, developed by the Tyndall Centre for Climate Change Research in the UK and recommended by the European Commission within the Covenant of Mayors signed in 2009); develop effective scenarios to mitigate climate change at the metropolitan level to reach the target of 80% in 2050; establish an ongoing process of evaluating this strategy and its implementation; sharing knowledge and experience on effective metropolitan mitigation practices and how they can be applied elsewhere. The partnership USEUCO2 has brought a transatlantic dimension to the project. A declaration of cooperation on environmental and climate issues between the European and American regions and metropolitan areas was signed in Virginia in 2008.

<http://www.eurometrex.org/euco2>

▪ **Connected Urban Development**

The Connected Urban Development programme was born from Cisco's commitment to the Clinton Global Initiative and a partnership between Cisco and different cities (Amsterdam, San Francisco, Seoul, Birmingham, Hamburg, Lisbon, Madrid).

These partner cities jointly develop innovative approaches in the field of sustainability in urban areas and information and communication technology (ICT). MIT brought a visionary perspective to these innovative approaches in the book *Connected Sustainable Cities* (Mitchell *et al.* 2008). This book presents the current and developing technologies, their use for monitoring personal water, energy consumption and GHG emissions, and for enabling participation in new markets such as personal carbon credits markets. It was endorsed by the cities and signed by their mayors.

<http://www.connectedurbandevelopment.org>

3. The main characteristics of a personal carbon trading scheme

Limiting personal CO₂ emissions through a cap and trade scheme is an innovative and ambitious public policy. This is partly because it consists of regulating individuals' emissions, which means an end to the current situation where emissions can be generated in unlimited quantities without bearing their costs. Secondly, managing this type of scheme requires implementing a very sophisticated ICT administration system.

The different models of personal carbon trading have the following points in common: setting limits on individual emissions, personal emissions accounting, and emissions trading on carbon markets.

3.1. Setting limits on individual emissions

A limit is set on the emissions of all the participants in the scheme. This limit is derived by determining an emissions reduction target for a defined period. This target is progressively set higher to fulfil the commitments made by governments concerning national emission reductions for 2050.

The reduction target for overall personal emissions is then applied to an individual level by allocating allowances to each participant. Participants regularly receive carbon budgets. The budgets are divided into carbon credits deposited into personal carbon accounts.

The overall personal emissions reduction target is then applied to an individual level by allocating allowances to each participant, who regularly receives a carbon budget. The budgets are divided into carbon credits deposited into personal carbon accounts.

3.1.1. Setting a limit on overall individual emissions

Setting a limit on individual emissions means defining the scope of the scheme and then determining the reduction target to be reached.

- **Scope**

A personal carbon trading scheme can cover emissions related to residential and transport energy consumption (PCAs, TEQs, DTQs) but also those associated with basic consumer goods (RAPS).

Defining the scope of the scheme depends on two elements: the level of responsibility of individuals for CO₂e emissions released in the atmosphere, and the feasibility of measuring those emissions.

A personal carbon trading scheme can firstly cover the emissions that are directly ascribable to individuals, meaning those associated with energy consumption necessary for heating and electricity in their homes, and daily transportation including commutes between work and home. It can also be expanded so as to include emissions generated indirectly by individuals, meaning those from basic consumer goods purchases like food.

Direct emissions (residential and transport energy consumption) are the easiest to measure. This is the reason why it is proposed, from the scientific as the political perspective equally, that these emissions fall under the scope of a personal carbon trading scheme. Emissions related to energy consumption in homes and transport, all modes included, would be regulated first. Public transport could be initially left out of the scope of the scheme because of a high number of transactions and the difficulty in measuring precisely their emissions (Bottril 2006).

Indirect emissions (generated during the lifecycle of products and services other than those used for residential and transport energy) can equally be regulated with personal carbon trading. This would mean being able to count the carbon content of all basic consumer goods on the market, and to precisely monitor a high number of transactions. This option is considered too complex and costly for the short term (Starkey *et al.* 2005). It would also be difficult to apply to certain services like hospital stays (Hillman *et al.* 2008). The voluntary and mandatory carbon or ecological label programmes for basic consumer goods initiated by the public and private sector in different countries constitute leverage for the implementation of a Rate All Products and Services (RAPS) scheme.

While waiting for the development of carbon labelling, two schemes could coexist: one scheme applying to individuals and covering their direct emissions, another scheme applying to organizations and covering individuals' indirect emissions. Individuals would be responsible for emissions associated to the energy consumption for their homes and personal transport while organizations (industries, hospitals, local authorities, administrations) would be responsible for the remaining emissions. This plan would correspond to the implementation of a Personal Carbon Allowances (PCAs) scheme parallel to other policies and measures applicable to indirect emissions. It could also give rise to the implementation of a Domestic Tradable Quotas (DTQs) or Tradable Energy Quotas (TEQs) scheme that would cover the national economy. The responsibility for emissions would then be shared between individuals and organizations. It should be noted that the part of national emissions that falls under the responsibility of individuals is higher in the framework of a PCAs scheme than in a DTQs scheme. This is due to the difference in scope of these schemes concerning transportation. Emissions linked to air travel and public transportation fall under the responsibility of individuals in PCAs and of organizations in DTQs.

Two types of difficulties arise when defining the scope of a personal carbon trading scheme.

The first is relative to the interrelation with existing emissions trading schemes such as the EU ETS. Establishing a personal carbon trading scheme would give rise to an overlap with the EU ETS concerning residential and air travel emissions. Energy producers, aircraft operators and individuals could be responsible for emissions related to electricity, heat and air travel. This would result in double counting emissions. Two options are possible. The first consists of maintaining both systems. It would not pose a significant problem as emission rights allocated to individuals would be different from those allocated to companies, which would lead to the coexistence of a national carbon currency and a European carbon currency (House of Commons 2008; Kerr *et al.* 2008). The second option consists in changing the rules of the EU ETS so as to include individuals. The implementation of a personal carbon trading scheme applying only to individuals, and covering the entirety of their emissions, could lead to an evolution of a DTQs scheme established at EU level into a RAPS scheme.

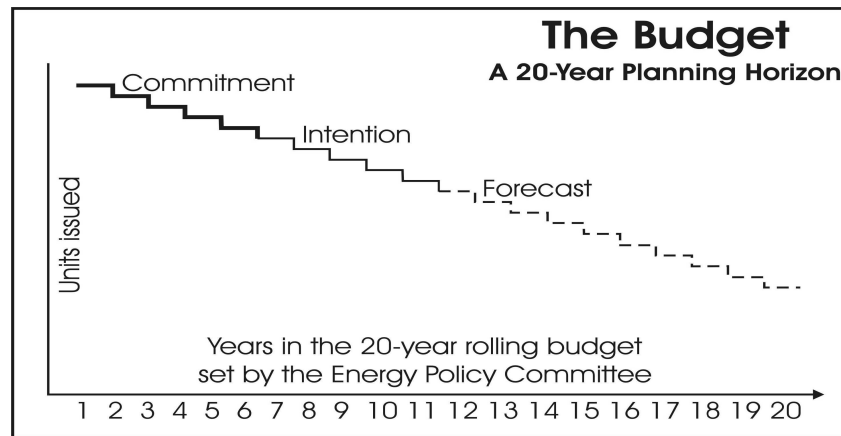
The second difficulty is due to the fact that emissions associated with international transport are not covered by the global climate change regime. Yet emissions relating to personal air travel would be counted in a PCAs or DTQs scheme, while a RAPS scheme would also cover emissions released by the transport of products. Personal emissions counting could therefore lead to integrating emissions generated outside the national territory. This approach is different than that of the United Nations Framework Convention on Climate Change because states' GHG emissions inventories only take into account the emissions generated by national production. The inclusion of the aviation sector, and possibly maritime transport, in the EU ETS however represents a model for domestic regulation of these emissions. This model is based on the principle of residence (taking into consideration the emissions linked to the production in and importation from a country).

▪ **Reduction target**

Once the scope of the personal carbon trading scheme is defined, the emissions reduction target to be reached must be determined. This target is set according to a year of reference. It could be determined according to the current level of emissions covered by the scheme.

The key goal for establishing the scheme is complying with the national and international GHG emissions reductions commitments for 2020 and 2050. Reduction targets should be set according to that perspective. They would be defined on a multi-year plan, and gradually increased until 2050.

David Fleming proposed a long-term plan with targets to be reached over a 20-year span. This plan gives visibility to the targets and prevents them later being called into question. He also recommended that emissions reduction targets be determined by an independent authority in order to guarantee the environmental effectiveness of the system.



Source: Fleming (2007)

3.1.2 Distribution of authorized emissions through the allocation of individual carbon budgets

Defining a personal emissions reduction target comes down to defining a carbon budget available for individuals. This carbon budget must then be distributed between participants of the scheme through the allocation of individual carbon budgets. This step consists of granting each participant the right to emit a limited quantity of CO₂e. This right can correspond to emissions authorized for each year. The individual carbon budget would be intended to cover the emissions regulated by the scheme. It would be divided into carbon units - or carbon credits - that must be surrendered according to the carbon content of purchases made. Individual carbon budgets can thus be compared to a carbon license points system.

By definition, anyone emitting CO₂ is apt to receive a carbon budget. But the advantages of having the right to a carbon credit allowance come with the obligation of surrendering credits to cover emissions related to purchases made. This is the reason the scientific and political proposals limit participation to people at least 16 or 18 years of age. People would be held responsible for their own emissions and those of the minors under their care.

Each participant would be registered on a national registry set up for that purpose. This registry would allow the administration in charge of operations to verify and record the participants' information and process the allocation of carbon budgets onto their carbon accounts.

▪ Allocation rules

The distribution of the authorized emissions amongst each of the participants constitutes a delicate phase. A choice has to be made between equal or adjusted allocations. The choice is eminently political.

Equal allocation - same quota for everyone - seems preferable. This seems simpler to implement because it consists of dividing the whole carbon budget by the number of participants. It is also fairer, particularly on a philosophical level (Defra 2008). An identical contribution to the fight against climate change would be asked of each participant, as they would all be given the same target to control emissions. The result would be equal treatment between participants, independent of their social position or of their current emissions, by the

allocation of the same right to emit GHG. The carbon budget available to individuals could be shifted through households so that each person of age in the household, or at least 16 years old, receives the same quota.

The carbon budget allotted to households would need to be adjusted in order to take the children into consideration. In the same manner as adults, children should benefit from an equal allowance. This brings up the question however, of the amount that should be reserved for children: should it be equal or less than the carbon budget allotted to adults? Proposals vary between the total amount, half or a third of the allowance. The allocation of a half quota per child is often considered in the scientific literature. The British government considered that the allocation of one third of an additional quota was a reasonable compromise (House of Commons 2008, b). Children have a lesser effect on household emissions than adults (Thumim *et al* 2008).

The principle of an equal allowance is not without difficulties. The amount of emissions actually generated by individuals varies immensely. Notably, the emissions of households that are better off are generally higher than the average level (Thumim *et al.* 2008; Lenglar *et al.* 2010). Because of this, this category of the population could invoke an allowance adjusted to their emissions history accordingly. This mode of allocation could be considered unjust as it would perpetuate the status quo (Seyfang *et al.* 2009; Criqui *et al.* 2009; Cochet 2010). As the table below shows, an equal allowance would be more favorable to lower income families who generally emit less than the average level. These households could receive payment for selling their unused carbon credits as their lifestyles are less carbon intensive. For this reason, a scheme based on equal allowances is considered to be fiscally progressive.

Table A: Distribution of gain and loss by equivalised income decile

Income deciles (equivalised)		% of group winning/losing	% of all HH's	Mean credit/deficit	% of all winners/losers
WINNERS	1 to 3	71%	21%	3,577	36%
	4 to 7	60%	24%	3,530	41%
	8 to 10	45%	13%	3,398	23%
LOSERS	1 to 3	29%	9%	-4,170	21%
	4 to 7	40%	16%	-4,532	39%
	8 to 10	55%	17%	-5,930	40%

Source: Thumim *et al.* (2008)

The fact that households with lower than average emissions could “trade in their deprivation for cash” could make some reticent. But it should be recognized that these households do not receive anything currently, while those with higher emissions pollute without bearing the costs (House of Commons 2008a). With the introduction of a personal carbon trading scheme, low carbon lifestyles would be rewarded while carbon intense living would be penalized.

An equal allowance is fairer than an allowance adjusted on past emissions. But it cannot be considered truly egalitarian (Starkey 2008). The level of personal emissions depends on individual lifestyles, professional situation (working or retired), and different factors such as place of residence (rural or urban), climate conditions, the type of dwelling (detached house or apartment), the type of heating, access to public transport, etc. Often emphasis is put on the fact that people living in rural areas emit more than those who live in urban areas, mainly because of their transportation needs. Research on these distribution impacts was carried out through the hypothesis of an introduction of a personal carbon trading scheme applying to energy consumption for the home and personal road transport (public transport excluded). Contrary to popular belief, the results showed that the emissions from populations living in rural areas are above all linked to heating (detached houses, old inefficient heating systems, frequent use of fuel oil, surrounding temperatures generally lower in the country).

Table 7: Household and road transport emissions by rural/urban classification

	Mean % of total emissions		Mean subtotal kgCO ₂		Mean Total kg CO ₂
	Road Transport	Household	Road Transport	Household	
Urban	29%	71%	2,079	5,090	7,169
Fringe	32%	68%	2,723	5,787	8,510
Village	27%	73%	3,284	8,880	12,164
Isolated	25%	75%	3,382	10,147	13,529
Other	19%	81%	2,840	12,106	14,946

Source: Thumim *et al.* (2008)

The question is raised whether it is better to allocate the same carbon budget to each person, or if it is better to adjust the budget by taking certain factors into consideration. The constitutional principle of equality does not pose an obstacle to establishing differences in treatment. An equal but adjusted allowance is conceivable, at least during the initial introduction of the scheme (Bird *et al.* 2009), even if it is more complex and costly to implement than a strictly equal allowance. This would need to be based on objective criteria. The differences in treatment must be appropriate concerning the target to protect the environment aimed for by the introduction of the scheme. Social elements that have environmental impacts could also be taken into consideration like household size (number of children), distance constraint concerning the work place, and the degree of control people have over their living conditions. The individual carbon budget could initially be the same for everyone, and then increased in increments according to actual environmental constraints, with concern for environmental justice instead of social justice (Rousseaux *et al.* 2010).

Adjusting the amount of carbon credits to be allocated would create additional difficulties, aside from not being able to satisfy all the demands (Brohé 2008; House of Commons 2008a; Thumim *et al.* 2009). Assistance measures, established in parallel, would be necessary. These measures could be oriented in priority towards people in fuel poverty situations (Parag *et al.* 2009). They could allow considerations for social justice to be brought in by making it easier for these people to stay within their carbon budget, without making too many adjustments or exemptions to the allocation rules. These measures could consist in structural interventions on accommodation, land, and transportation (Theys 2009; Fitz 2009). Personal carbon trading would inevitably reflect existing inequalities in income and opportunities to reduce emissions (House of Commons 2008a). Assistance measures could also take the form of a programme of green technology development (Desmesttre 2009) or financial support like a VAT at a reduced price for low carbon goods (Parag *et al.* 2009).

▪ Allocation methods

Two methods for allocating carbon credits to individuals are considered: one that is free of charge and one that is paid for. Free allocation is most often considered. Allowances that are paid are also evoked (Blake 2008). With the free allocation a person only pays if its carbon budget is exceeded. In a paid allowance system, a price is paid for the entire amount of emissions generated.

3.1.3. Deposit of carbon credits into personal carbon accounts

A carbon account is opened in the name of each person or household that participates in the scheme. It would contain the carbon credits allocated by the administrating authority, and those acquired from other people (see below). The allocation procedure would be similar to a bank transfer. It would involve the authority in charge of allocating the credits and the administrator of the account.

The creation of carbon accounts is dependent on a data infrastructure that would serve as a carbon bank. A high level of security is consequently required.

Different options are considered. A government carbon bank could be created through the formation of a central database. Existing bank infrastructures could also be used within the framework of a state delegation for the banks to administrate the carbon accounts. The second option is less costly (Roberts *et al.* 2006; Lane *et al.* 2009). Personal carbon accounts could equally be opened in the national registries created under the Kyoto Protocol. This would mean that the carbon credits allocated were assets of the state.

The creation and administration of personal credit accounts, as well as the automatic collection of data into the accounts (see below) would be costly. The first estimations were given within the framework of the pre-feasibility study carried out in the United Kingdom (Lane *et al.* 2008). They seem to have been largely overestimated (Bird *et al.* 2009; APPGPO *et al.* 2009).

3.2 Personal emissions accounting

Personal emission accounting functions by recording the carbon content of purchases made by individuals, and thus determining the corresponding amount of carbon credits to be surrendered. This requires displays at the points-of-sale detailing the carbon content of the products and services covered by the scheme.

3.2.1 Carbon labelling of products and services

Carbon labelling aims to inform consumers of the quantity of emissions related to the purchases that they wish to make. It would also allow emissions to be recorded at the moment of payment.

The products and services covered by a personal carbon trading scheme would be given two values: monetary and carbon. A double labelling should thereby be in place at the point-of-sale.

Carbon labelling means determining the carbon content of products. There has been a boom in carbon calculators developed in the private and public sector using different methodologies. These tools have the advantage of allowing individuals to measure their carbon footprint and become aware of their environmental impact. The implementation of a national public policy for emissions reduction based on a cap and trade scheme does however require a harmonization of methods for calculating the carbon content of products and services.

A harmonisation of methods for calculating emissions related to energy sources is already in effect in many countries. This is the case for example with emission sources defined in France by the ADEME's Bilan Carbone method, and in the UK by the Act On CO2 calculator. These carbon coefficients correspond to the emissions generated during the production and combustion of each energy source.

Translating Emissions into Fuels	
Estimates of the global warming potential (GWP) of gases released by the production and combustion of fuels. 1 kg carbon dioxide = 1 carbon unit. The GWP of methane and nitrous oxide is measured as carbon dioxide equivalents.	
Fuel Carbon units	
Natural gas	0.2 per kWh
Petrol	2.3 per litre
Diesel	2.4 per litre
Coal	2.9 per kg
Grid electricity (night)	0.6 per kWh
Grid electricity (day)	0.7 per kWh

Source: Fleming (2007)

Efforts on normalizing carbon and environmental labelling for basic consumer products are being done on national levels (PAS 2050 in the UK, reference BP X30-320 in France for example) and international levels. The imperative for a harmonisation of carbon labels could

lead to the formation of a database that would include the carbon information of products and services. This approach is developed particularly in France.

3.2.2. Recording the carbon content of purchases

Personal emissions are counted by recording the carbon value of purchases made. The collected data is transferred onto the carbon account. The emissions related to the purchases would be accrued, providing the means to measure the overall emissions of individuals. Following the same principle as a bank account, only the carbon value would be transferred onto the carbon account. A personal carbon trading scheme would aim to establish emissions tracking related to purchases, and not track the purchases themselves.

The personal carbon trading scheme would rely on electronic administration. The procedure for counting emissions would be automatic. It would consist of an exchange of information between information and communication technologies (ICT) and carbon accounts.

The individuals could count their emissions themselves by manually reporting the carbon value of their purchases onto their carbon accounts. But this mode of emissions counting would be tedious, especially in the framework of a RAPS scheme covering the ensemble of products offered to consumers. Nor would it be reliable. There could be room for fraud in declaring emissions, which would affect the integrity of the system. Plus it would be difficult and costly to check invoices after the fact, taking the current tax model as an example.

The use of cards to measure personal emissions is favoured because they use universal readers. This explains why personal carbon trading schemes are often called carbon card programmes. Other ICT could be used as personal emissions measuring instruments. Smart phones and smart meters are two examples.

The role of ICT would consist of measuring and declaring emissions onto carbon accounts. Measuring and declaring emissions could be performed at the moment of payment. This would be the case with payments by card (at points-of-sale, online, or by bank transfer) or smartphone. Data on energy consumption collected by smart meters would be converted into carbon with the help of internal software before being transferred to the account.

A carbon card could be a specific card or a multifunction card. The latter presents an advantage in terms of practicality for the individuals because it would dispense of the need to have an additional card in their wallets and using two cards at checkout. Adding a “carbon counting” function on bank cards is beginning to be studied. A bank card would make it possible to simultaneously record the monetary and carbon values of purchases made. Certain adaptations would be necessary so that the same chip could transmit two types of information, via two distinct channels, to two separate accounts, one credited with conventional currency and the other with carbon currency. This would equally apply to payments made by smartphone.

The environmental integrity of a personal carbon trading scheme depends directly on the accuracy and reliability of emissions measurement and declaration. In the framework of existing emissions trading schemes, a third party verifies the data obtained from carbon accounting before its declaration. In the framework of personal carbon trading scheme based on electronic administration, the verification procedure could consist of an ICT certification which could be used to count individuals' emissions. The certification would attest to the accuracy and reliability of these tools as well as their security. Indeed, the value of the carbon credits should rise as their scarcity increases, due to the increase of reduction targets to be met. Consequently, it would be necessary to prevent fraudulent use of stolen or fake cards and the emergence of carbon credit black markets (Starkey *et al.* 2005; Cohen 2010).

Emissions could not be counted automatically if purchases were paid for with cash or check. The retailer would have in that case to declare the emissions, and surrender the corresponding amount of carbon credits (see below). The carbon price would be added to the total of the goods and paid for by the individuals. This procedure is called “pay as you go” and can be assimilated to an added carbon tax. It could also apply in cases where a person forgets its card or does not have one as would be the case for minors or temporary residents not submitted to a similar scheme in their country of origin. Surtax would be added for individuals who don't fulfil

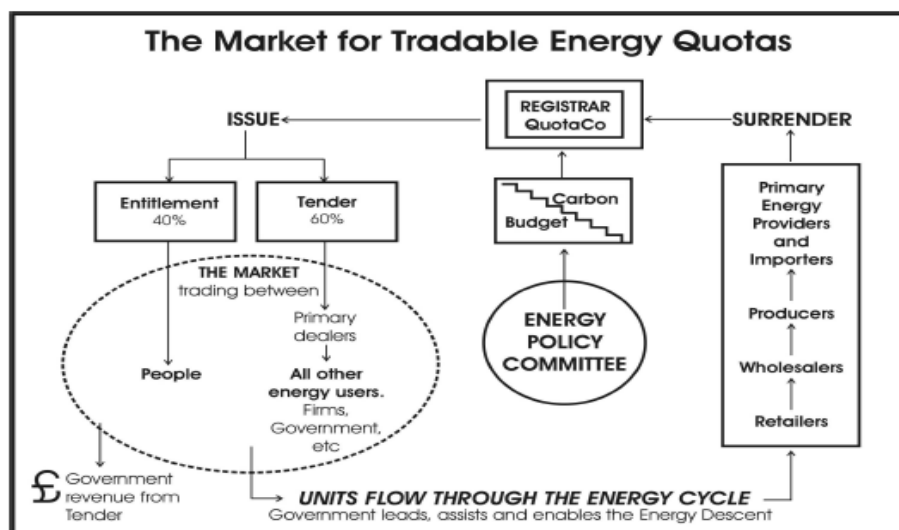
the emissions accounting and credit surrendering obligations themselves. The credits would be bought by the retailer at market price plus administration charges due to market intermediaries. Regular inspection procedures would need to be put into place in order to verify that retailers respect the requirements of declaring the emissions of purchases. This regime could be similar to the one used for the VAT (Lane *et al.* 2008).

The potential loss of liberty with personal carbon trading is sometimes raised. CO₂ emissions related to purchases made by individuals constitute personal data. This falls under the protection of personal data regime established on the international, European and national scale (Information technology, files and liberty law in France). This regime consists in particular to guarantee the confidentiality of data collected, protect against misappropriation of the data collecting process and limit the length of time data can be kept. However, information concerning personal CO₂ emissions is not of a sensitive nature (this category is reserved to data concerning people's philosophical or religious opinions, health or sex life). Neither can personal CO₂ emissions become sensitive data from interconnection with other personal data in a network. The risk of cross-referencing files is raised in the general context of IT development. Any eventual cross-referencing of personal CO₂ emissions with other registered data would reveal nothing deeply private aside from an individual's carbon footprint. Knowledge of this data would be similar to knowledge of utilities consumption, like water or electricity, which does not constitute sensitive personal information. The potential loss of liberty from a personal carbon trading scheme is therefore very slight due to the low informative content of the data collected.

3.2.3. Surrendering carbon credits for emissions from purchased goods

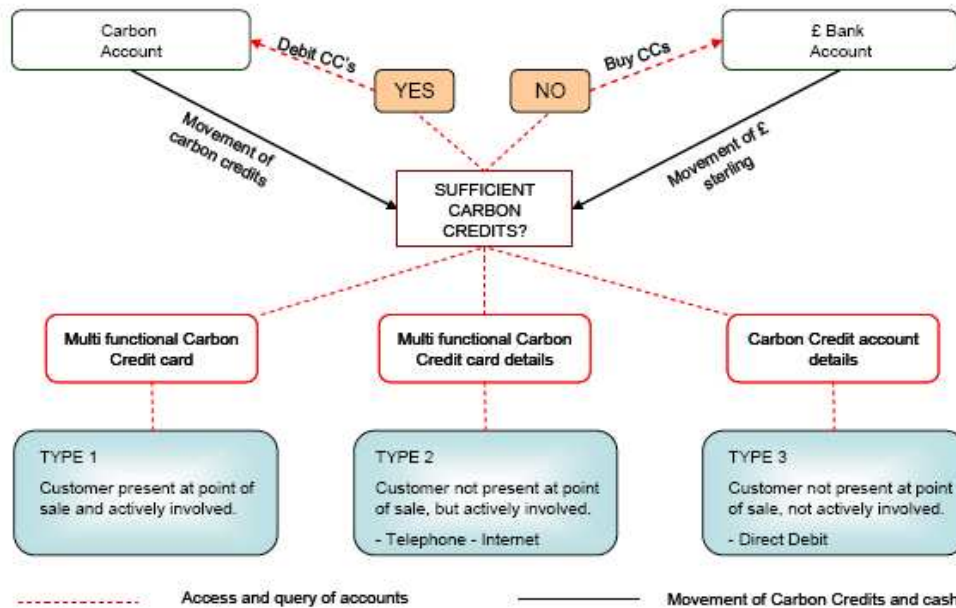
The declaration of emissions related to purchases made is the foundation of the credits surrendering procedure along with their debit from the carbon account. Carbon credit surrendering would follow the form of a bank transfer. The quantity of carbon credits that corresponds to the emissions from purchases would be deducted from the personal carbon account and transferred to the account to which they are to be returned.

In the framework of an allowances scheme applying only to individuals (PCAs, RAPs), the carbon credits would be surrendered to the authority in charge of their allocation. In the framework of an allowances scheme that covers the national economy (TEQs, DTQs), the carbon credits would be surrendered to the retailers and traded between different intermediaries in the economy before being finally returned to the authority in charge of their allocation.



Source: Fleming (2007)

Overdrafts on carbon accounts would not be authorized. Individuals who would have depleted their carbon credits before the next allocation date would have two possibilities: acquisition of additional carbon credits (see below), or paying the price of the credits surrendered by the retailer at checkout ("pay as you go").



Source : Lane *et al.* (2008)

3.3 Trading emission rights on the carbon market

Participation in a personal carbon trading system would involve managing a carbon budget in order to stay within the authorized emissions limit. Successful carbon budget management would be aided by the development of carbon capacity which would facilitate thinking and counting in CO₂ (Seyfang *et al.* 2009). Educational programmes, assistance, and advice on means for managing emissions and understanding the carbon value of daily activity, could be established during the initial implementation of the scheme (Parag *et al.* 2009) in order to encourage public involvement. Guides for individuals on reducing emissions are beginning to be developed (for example Goodall 2007).

The only legally binding obligation individuals would have to comply with is surrendering the amount of carbon credits that corresponds to the carbon content of their purchases. On the other hand, the individual carbon budget would be flexible. Exceeding the budget would be authorized through the means of acquiring additional credits to cover the excess of emissions. Conversely, surplus carbon credits could be sold or saved for future use. This could be assimilated to a reward-penalty mechanism according to how the carbon budget is managed. Carbon credits could be traded between individuals or by intermediaries (see below).

3.3.1. Application of a reward-penalty mechanism according to the management of individual carbon budgets

Incentives to stay within the allotted carbon budget would result from sending a price signal on CO₂e emissions. Both over spending and under spending emissions would result in payments. Surplus carbon credits could be saved for future use or sold to those who exceed their budget. Personal carbon trading would aim to reward low carbon lifestyles and penalize carbon intensive lifestyles. It could be fiscally neutral for governments as long as the rewards given to those who stay within their carbon budgets are paid for by the penalties from those who don't.

The possibility of being able to trade carbon credits aims to bring flexibility to the personal emissions cap. Without trading, personal carbon quotas schemes could be seen as emissions rationing tools (Roodhouse 2007).

The point can be raised that the possibility of being able to trade perpetuates the status quo for carbon intensive lifestyles by paying a tax on excessive emissions. On the other hand, low

carbon lifestyles would be rewarded, which is not the case with an emissions tax. A limit could be set on the surplus amount that could be authorized, similar to a bank overdraft. But this could lead to the creation of a black market for carbon credits. However, it is conceivable to vary the price of additional carbon credits according to revenue. People in a tax bracket above a certain level could pay a higher price in the event of a considerable carbon budget overrun. This could create an incentive to reduce their emissions.

Individuals would be free to manage their carbon budgets as they see fit. Carbon credits would be used according to personal priorities. Certain people could favour savings through transportation while others might concentrate on carbon savings in the home.

Staying within the initially allocated carbon budgets should be relatively easy for the majority of the population. In the beginning the limits set on personal emissions should be relatively close to current levels. Only those with carbon intensive lifestyles would have to make some changes to bring their emissions under control, and pay a fine if they weren't successful. However, gradually everyone would be required to try harder, to keep in line with the raising of targets. This effort would first consist in using goods which are more energy efficient, employ renewable energies, or generate little carbon during their production and distribution. Efforts then could turn toward sensible lifestyle modifications through accepting an alternative principle of consumption from that which is considered normal (Szuba *et al.* 2010). The end goal of personal carbon trading schemes is to change behaviour and incite the adoption of low carbon living.

3.3.2. Trading

Carbon credit exchanges would be performed through bank transfers between carbon accounts. Individuals could proceed with sales and acquisitions between themselves, or call on intermediaries such as their account administrator.

Carbon credits could be traded against payment or for free. Arrangements could be made between friends, family members or work colleagues for example. Trades would need to be done according to procedures that guarantee the legality of the carbon credits available on the accounts. Should the opposite occur, the carbon credits would not be valid and would be considered to be illicit carbon currency. They would not be eligible for surrendering to cover personal CO₂ emissions.

In conclusion, it can be said that personal carbon trading presents, for its promoters, many advantages over other economic instruments such as a carbon tax or allowance schemes applying to providers of goods and services (who would need to cover their emissions by procuring emission permits from the authorities in charge of their allocation - "upstream" system - or from individuals to whom they are initially distributed - "cap and share" system -)

The advantages put forth are the following (for example Roberts *et al.* 2006; House of Commons 2008; UKERC 2008; APPGOPO *et al.* 2009):

- environmental efficiency (guaranteed emissions reductions)
- visibility of personal emissions (information on the carbon impact of different lifestyles which constitutes a force for behavioural change)
- equitable contribution to climate change mitigation (same reduction target to be reached by individuals)
- individuals are free to manage their carbon budgets as they see fit (choice according to emission sources)
- progressive tax system (carbon credit trading would result in rewarding people with lower emissions and penalising those who exceed their carbon budget).

4. Existing individual card and personal CO₂ emissions monitoring programmes

A large number of individual card programmes and personal CO₂ emissions monitoring programmes have already been established across the world. 44 programmes have been described and analysed in this study (see summary table). Each programme has its own fact sheet in the annexes.

The programmes listed were launched in the 2000's through initiatives in the private and public sector: banks, consultancy firms, distributors, local authorities, research centres and groups of individuals. They are proposed across Europe, North America, Asia and Australia. Some programmes are established permanently and some for limited periods of time from a few weeks to many months.

All the programmes are geared towards individuals and are based on voluntary participation. They follow different approaches however. Their conception and implementation procedures can vary noticeably.

Most of the programmes aim to raise individuals' awareness of their environmental impact. Raising awareness consists in communicating quantitative data on this impact. This data allows citizens to become aware of their overall environmental impact (due to their lifestyle) or specific impact (due to certain purchases and certain behaviour). These programmes can sometimes create incentives to reduce lifestyle environmental impacts. Some programmes are dedicated specifically to the fight against climate change; others promote sustainable development in general.

Despite the diversity of these programmes, they can be analysed from different angles, enabling the identification of points in common and divergences. Comparative analysis of these programmes permits the understanding of their key goals and the conditions of their implementation. This analysis also provides insights for implementing potential mandatory programmes.

4.1 The different types of programmes

The majority of programmes are based on card use. These cards do not always fulfil the function of monitoring the cardholder's emissions. Certain programmes introduce monitoring but without depending on card use.

The programmes studied can be classified into four categories, corresponding to the approaches they follow: carbon accounting and reduction, carbon offsetting, support for sustainable consumption and behaviour, donation.

4.1.1 CO₂ emissions accounting and reduction

This category of programmes is the most recent. Eight have been studied, seven in Europe and one in the United States. The initiators of these programmes are consulting firms, research centres, organizations, distributors and groups of individuals.

The carbon budget allocation or incentives for reducing emissions below a baseline programmes make up a part of this category. The first programmes were developed in the UK by the CRAGs, RSA, LGIU, and WSP Group, and in France by Nature & Decouverte. Later programmes were developed by MyCO₂ (France), Objectif Climat (France), VATT (Finland) and MyemissionsExchange (US).

There are two key objectives for the implementation of these programmes: development of measuring methods for personal CO₂e emissions related to purchases made by individuals, incentive for reducing the carbon impact related to lifestyle. The emissions reduction targets to

be reached by those participating in the programme are set according to their current emissions average.

4.1.2 Carbon offsetting

Carbon offset programmes are essentially offered by banks, sometimes in partnership with consulting firms. 11 have been studied in Europe, the United States and Australia.

These programmes consist in offsetting all or part of the carbon footprint of individuals by buying and cancelling carbon credits. The quantity of CO₂e emissions to offset can be decided according to those generated by individuals. The programmes that fall under this category are offered by Everbright Bank and Beijing Environment Exchange (China), Climactis et Villière (France), Rabobank (NL), Repay International (NL), and National Forest Foundation (United States).

The amount of emissions to offset can also be decided according to the individuals' card use (the number of monthly transactions, sums spent, gift cards). The programmes falling under this category are offered in the United States by Brighter Planet and Bank of America, Fintura Corporation and Metabank, ReDirect Guide and Shorebank Pacific, in Australia and the United States by GE Money, in Spain by Triodos Bank and in France by 5Continents.

Two programmes have already been disbanded even though they were only recently launched (one by GE Money in the United States and the other by Rabobank).

The key objectives pursued by the implementation of these programmes vary. The offset programmes operating on the basis of emissions generated by individuals seek to mitigate those emissions. Programmes that offset according to card use are referred to as "green washing." This approach is the most frequent. An environmental aspect is simply added to the procedures for client financial rewards that are approved by certain banks.

4.1.3. Support for sustainable consumption and behaviour

This programme category is currently the most widespread. The 15 programmes studied are offered in Europe, the United States and Canada by city councils, distributors, consulting firms and banks.

These programmes operate on the basis of granting financial support for sustainable consumption and behaviour. This financial support is approved according to purchases and behaviour. The programmes that fall into this category are offered in the following countries: in France by Bricomarché, ConsoGlobe, E. Leclerc, Monoprix, in Belgium by Bond Beer Leefmilieu and Limburg.net, in Germany by the city of Heidelberg, in the United Kingdom by Tesco, in the United States by Interra and UMB, in Canada by the city of Toronto, as well as a European programme carried out by the city of Belfast. The financial support can also be based on card use, the sum of purchases made in particular. This type of programme is offered by Green Rewards (UK) and Wells Fargo (US).

The key objective of these "green loyalty" schemes consists of encouraging people to adopt sustainable purchasing and behavioural habits by granting gifts, discounts or points. The collection and spending procedures for these points vary according to the programme (see below). The programme offered by Wells Fargo consists simply in adding an environmental aspect to the procedures of client financial rewards that are already approved by the bank.

4.1.4. Donation

This category of programmes is different from the others in the sense that there is no goal to make individuals aware of their environmental impact. The donation programmes provide financial support to ecological programmes and charity. This dimension is often present in the aforementioned programmes. The programmes established by Bank of America (US), Barclays Co-operative Bank (UK), HSBC (France and Hong Kong), Crédit Coopératif, HSBC, La Banque

Postale, LCL, Société Générale, Truffaut (France), and USB (Switzerland) are mentioned in this study for the sake of completeness.

There has been a multiplication in Europe, and specifically France, of co-brand bank cards on which figure the logo of the organizations or foundations benefiting from the sums collected. It can be underlined that this development is linked to the evolution of the banking context following the implementation of the European project SEPA (Single Euro Payments Area).

4.2. Scope of the programmes

All the programmes in this study are geared towards individuals. They do not set out specific conditions for participation aside from the stipulation of being eligible for a card offered by the banks.

The programmes aim to make individuals aware of the environmental impact of their lifestyles. The environmental impact of the individual's private life is principally taken into account (transportation, dwelling, food, clothing, hobbies, etc.). The environmental impact of professional life is sometimes the focus (home/work commutes in the programme established by Nature & Découverte, for example). The programmes can be established in a professional framework but apply to emissions relating to people's private lives (WSP Group).

Carbon accounting and reduction programmes as well as carbon offset programmes have the largest scope. They cover first the energy consumption for the home and transport (direct CO₂e emissions). Other emissions sources, and notably daily consumption, are sometimes covered.

The programmes that support sustainable consumption and behaviour aim to promote sustainable development (CO₂e emissions reductions, economy of raw materials, social economy, etc.). They consequently cover a wide spectrum of daily activities. However, their scope is more limited than the two aforementioned programme categories, as they do not apply to specific behaviour or purchases that respect the environment. Purchases and behaviour that are not sustainable are not taken into account. This limits the scope of the programmes.

Programmes are established on a local scale (communities of people or local authorities), national scale (by distributors or companies), or supranational scale (partnership installed between four European regions within the framework of the SUCCESS programme carried out by the city of Belfast).

4.3. Individual consumption monitoring devices

Individual consumption monitoring is used with programmes based on carbon accounting and reduction, carbon offsetting, and support for sustainable consumption and behaviour. Some exceptions apply to offset programmes and programmes that support sustainable consumption and behaviour according to card use. These programmes operate on the basis of the sum of purchases made or the number of monthly transactions performed.

Individual consumption monitoring is designed to count the environmental value of purchases made by individuals and relay the relevant information to an account. This environmental value can correspond to a quantity of CO₂ emissions, number of points, or reduction coupons.

Individual consumption monitoring can also consist of measuring the carbon footprint of individuals by accumulating emissions related to their purchases. Monitoring enables assessment of compliance with emissions reduction targets (carbon accounting and reduction). It also enables the calculation of the quantity of emissions to offset (carbon offset programmes). All purchases can potentially be considered. Only the purchases made by card and automatic transfer are considered in carbon offset programmes.

Monitoring individual consumption can also consist of collecting discounts or points that are awarded for specific purchases. Green loyalty programmes operate with these mechanisms. Points can also be given for specific behaviour like recycling waste (De e-portemonnee and SUCCESS, for example).

Monitoring individual consumption helps to determine the quantity of CO₂e emissions to carry over to an account or to offset, and the number of points or the monetary value to deduct or accredit.

The environmental value of purchases is determined according to different methods. The carbon footprint of purchases can be calculated exactly or at a fixed rate. Precise calculation of the carbon footprint of purchases is based on data issued from the product life cycle assessment (LCA). Reference databases, when they exist and are approved by the public authorities, are used for the quantification of emissions. They are used specifically for the calculation of emissions associated with residential and transport energy consumption (Bilan Carbone method of the ADEME in France and the Act On CO₂ calculator of Defra in the UK for example). In the absence of a database, for basic consumer goods in particular, different options are possible: perform a LCA (Tesco's Green ClubCard), or use generic or specific LCA data available to the public (Compte Carbone of MyCO₂). LCA data can be completed by an input-output analysis founded on the monetary fluctuations of different economic sectors (VATT's Climate Bonus programme).

Carbon footprints are calculated broadly when based on the amount of purchases. This calculation method is employed with offset programmes. Since purchases made by bank card cannot be distinguished, programmes operate on the economic activities classification. These activities are separated into different categories. Each category receives a code. Offset programmes allocate a fixed amount of emissions per monetary unit spent for emission sources (transport, dwelling, leisure activities, food, clothing, etc.). This means only emissions from payments made by card and automatic transfer are treated. An exception is the Lowcarbon credit card launched in China by the Everbright Bank and Beijing Environment Exchange. The quantity of emissions to offset by the cardholders is a fixed amount. On the other hand, the emissions generated are measured accurately and reported by individuals onto a website created for this purpose.

The number of points, or the sum of the discount coupons, allocated to sustainable purchases or behaviours is set arbitrarily. It can depend on the sum of purchases made (1 point for 1 euro spent for example). This method is used in the framework of certain programmes that promote sustainable consumption and behaviour: those that operate on the basis of card use (Green Rewards and Wells Fargo Rewards), and those that are based on purchases made and behaviour adopted (Meillure pour ma planète, consoGlobe, Green Clubcard, Eco Rewards, Umwelt Plus Karte). The points or discount coupons are sometimes attributed for the purchase of labelled goods. They can also be attributed for specific actions (recycling waste, use of public transport, etc.). In the latter case, coherence in the procedures for attributing points is sought (De e-portmonnee, SUCCESS). A charter can be developed for this purpose.

The environmental value of products and services is sometimes displayed in the points-of-sale. This value essentially corresponds to a number of points or a discount sum. The display of the carbon footprint of goods is starting to be developed in pace with ongoing work on this topic and implementation of incentive schemes for reducing individuals' carbon footprints. Different retail chains have started to display the carbon content of some or all of their goods offered to clients (Casino and E.Leclerc in France and Tesco in the United Kingdom).

4.4 Individual consumption monitoring methods

Individual consumption is monitored by recording the environmental values allotted to purchases made. Each programme participant receives an account. The recorded data is transferred onto the account (discounts that are applied at the checkout are exceptions to this). Online accounts created specifically for environmental accounting relating to purchases are the most prevalent. The accounts are sometimes electronic documents. The programmes Carbon Rationing (UK) and Volontaires pour le climat (France) are examples. In the framework of carbon offset programmes, bank accounts include an additional column indicating the carbon footprint of purchases.

The data concerning the environmental value of purchases is collected automatically or manually. The automatic collection is performed by card. It is most often a bank card (offset

programmes) or a loyalty card. Loyalty cards are frequently used within the framework of programmes that support sustainable consumption and behaviour. They are also used with some emissions accounting and reduction programmes. The loyalty card Nectar, the most widespread in the UK, was used for the pilot test of the automatic carbon accounting related to purchases of fuel in BP petrol stations run in 2008 within the framework of the CarbonLimited programme. Loyalty cards offered by the retail chains are also used to measure the carbon footprint of purchases made in their stores (Climate Bonus and Compte Carbone). These two programmes also use point of sale systems to collect data. An electronic identity card is used in one programme (De e-portemonnee). The different cards used to collect environmental data can have different names. They most often carry the name of the programme. They can also be called carbon cards (SUCCESS) or green cards (ClimaCount). They allow the environmental value of purchases made to be carried over to the account. Smartphones are also used within the framework of the Climate Bonus and Compte Carbone programmes. Individuals can scan product barcodes to know the environmental value of purchases they wish to make. They can also record this value which is then uploaded onto the account.

In the absence of card use, data is collected manually. The manual collection of data consists in individuals counting their own emissions by reporting the information of their purchases onto their accounts. This mode of data collection is used especially within the framework of CO₂ accounting and reduction programmes, but also in programmes that support sustainable consumption and behaviour (use of electricity from renewable energy and production of compost are reported by the participants in the De e-portemonnee programme). Participants' emissions are also measured in this manner in the Low-carbon credit card offset programme. The data reported manually by individuals can correspond to the environmental value of products and services when this is indicated on receipts. The display of this value on receipts is not yet widespread. It is the purchases themselves that are most often reported in order to determine their value with the aid of carbon calculators.

Data transferred onto an account is considered to be reliable when it is collected automatically. It does not have to be verified for this reason. Verification is more complex when the data is reported manually onto an account. Verification is not necessary when there is no financial mechanism backing the individual consumption monitoring scheme (see below). The Volontaires pour le Climat (Volunteers for the Climate) programme, for example, only makes individuals aware of their carbon footprint and the means to reduce it. Certain programmes operate on the basis of trust in the participants' declarations (PACT Scheme for example). Others can require copies of receipts (MyEex). A false declaration can lead to eviction from the programme (De e-portmonnee). Manually collected data can be used to measure carbon footprints in order to allow individuals to know their emissions level, but not to calculate possible rewards that they might receive. Only purchases recorded by card can be eligible for a reward (Climate Bonus and Compte Carbone).

4.5 The financial mechanisms behind the programmes

The financial mechanisms behind the programmes create economic incentives for individuals to reduce their carbon and ecological footprints. Positive and negative economic incentives exist.

Positive economic incentives grant rewards. In the framework of offset and emissions reduction programmes, a reward is granted according to the rate of reductions performed against a baseline (carbon budget allocated or emissions reduction target to be reached). In the framework of programmes that support sustainable consumption and behaviour, the adoption of certain purchases or actions leads to rewards.

Negative economic incentives penalize. A price is attributed to the emissions generated (offset programmes), or to a carbon credits deficit (carbon accounting and reduction programmes based on the allocation of carbon budgets). In both cases payment goes to offset emissions. The difference is if the emissions to offset correspond to discharges of CO₂ from individuals or deficits in their carbon budget.

Financing for the economic incentives vary according to the programme. When the programmes only grant rewards, they can be financed by individuals (sale of carbon credits corresponding to emissions reductions made in the framework of the MyEex programme), by the programme

sponsors (subsidies granted to the SUCCESS programme for example), or by economic partners participating in the programmes (Community Card, Live Green Membership Card and Compte Carbone). In the framework of classic loyalty programmes, rewards are financed by retail chains, or by the producers of the goods that are promoted by the retail chains. The problem is even if the programmes are established permanently, the backing for the products that respect the environment is temporary. Promotions on these products are periodic. The rewards that are granted in programmes that promote sustainable consumption and behaviour come in the form of gifts, discounts or points. They are not always dependent on the acquisition of products that respect the environment. When this is the case, redeeming discounts and points create a virtuous circle of responsible consumption (consoGlobe, Green Rewards, Live Green and Compte Carbone for example). A list of the procedures for spending earned points is sometimes available (De e-portemonnee and SUCCESS).

Only offset programmes operate on the basis of payment for emissions generated. Payment is covered by the individuals (Carbon Capital Fund and Low-carbon credit card), or by the programme sponsors that allocate part of the profits from the sale of the card to individuals (ClimaCount, Rabocard, Brighter Planet Card, GreenPay Mastercard, Eco Mastercard, ReDirect Guide Visa, Visa Triodos credit card).

A reward-penalty mechanism is planned for offset and emissions reduction programmes operating on the allocation of carbon budgets. Rewards given to people who have not used their entire carbon budget are financed by the penalty imposed on those who exceeded their budget. A price ceiling is sometimes set on the rewards and penalties (Carbon Rationing and PACT programmes). Rewards are not necessarily granted to people. They can be allocated to a carbon fund designed to finance means for the community to reduce emissions (Carbon Rationing), or to charity organizations (PACT scheme).

There is the possibility for individuals to donate some or all of their reward (points or carbon credits) (Community Card, GreenCommerce, Wells Fargo Rewards, MyEex, Compte Carbone). Part of the turnover made can also be given to this affect (Compte Carbone) in the same way as with charity credit card programmes.

Links have been established between certain programmes and the carbon market. Most often they consist of purchases of carbon credits on the market in order to offset the emissions of individuals. The construction of an emissions credit purchasing platform is the objective of the Low-carbon credit card. Emissions reductions made by individuals can also be redeemed on the market through the sale of carbon credits generated (MyEex). Carbon credits bought or earned come essentially from non-regulated markets (emissions reduction projects which are not registered under the Kyoto Protocol). Certain offset programmes allow the acquisition of carbon credits from projects registered under a Clean Development Mechanism (CDM) of the Kyoto Protocol. CarbonLimited is the only programme so far to have created an autonomous carbon market. It is a virtual market where carbon units are traded between individuals.

4.6. The currency used in the framework of the programmes

Two currencies are used in the programmes studied here. Conventional money, first, is used in three ways: for buying carbon credits on the market (offset programmes), to grant rewards (percentage of the sum of purchases planned by certain programmes promoting sustainable consumption and behaviour), and for the payment of penalties (emissions higher than the budgets allocated in the framework of certain offset and emissions reduction programmes). Conventional money can also be used to finance projects or organizations (donation programmes).

Parallel currencies are also used: carbon units and points (most often Green points). These currencies serve as means of payment for products and services on the market (points) or CO₂ emissions (carbon units). The carbon units allocated to participants in the CarbonLimited programme, during its initial phase of implementation, were debited from accounts according to the emissions related to purchases made by the individuals, and could be traded between individuals depending on the management of the carbon budget they were allocated. This carbon currency was valid only for the personal carbon trading experiment.

5. Conclusion

The scale and speed of the reductions of GHG emissions to be made for 2050 to limit global warming of the Earth to 2°C compared to pre-industrial levels, and reach the ultimate objective stated by the United Nations Framework Convention on Climate Change requires the mobilisation of all emitters, including individuals. This explains the attention given to personal carbon trading in the scientific and political spheres, especially in the UK. Reducing CO₂e emissions of individuals by implementing mandatory personal carbon trading schemes is an innovative and audacious public policy. This consists of defining the quantity of carbon dioxide that each person is authorized to emit and ensuring that targets set are reached by accounting purchase-related emissions.

The UK, first country to have officially considered personal carbon trading, assessed after a pre-feasibility study that this instrument was too far ahead of its time for the moment, and that voluntary experiments with pilot projects could produce more information on the subject (Defra 2008b; House of Commons 2008b).

This study describes a large number of voluntary programmes geared towards individuals. These programmes are established all over the world through initiatives from the public and private sector. Their goal is not necessarily to experiment with personal carbon trading.

The programmes studied are classified into four categories according to the approach taken: CO₂ emissions accounting and reduction, carbon offsetting, support for sustainable consumption and behaviour, donations. Among these four categories, the first three aim to make individuals aware of the carbon and/or environmental impact of their lifestyles and encourage them to reduce this impact. But they are not all equally efficient at changing behaviour and reducing personal CO₂ emissions.

Carbon offset programmes do not create incentives for behaviour change. They enable the mitigation of individuals' carbon impact by cancelling part of the emissions by financing emissions reduction projects. Furthermore, individuals rarely finance offsets directly, which does not give them a sense of responsibility for their emissions.

Programmes that support sustainable consumption and behaviour have a limited effect. They stimulate the adoption of purchasing and behaviour that respect the environment, and thus limit individuals' environmental impact. But the purchase of sustainable goods does not stop the purchase of goods that are not sustainable. The impact of non-sustainable goods is not taken into account in these programmes. Individuals are hence not made aware of the overall environmental impact of their lifestyles.

The CO₂ emissions accounting and reduction programmes listed have an impact on environment and behaviour. Emission reductions as well as changes in behaviour (modification of modes of transport, the use of electric appliances at home, and food habits) are noted during the implementation of the programmes. Changes in behaviour are especially observed with participants in the programmes established by the CRAGs and WSP Group. This is due to the cap set on personal emissions, sometimes matched with the application of a reward and penalty mechanism that functions according to whether the limit was respected or exceeded.

Despite the diversity of programmes studied, their comparative analysis provides useful lessons for the possible implementation of mandatory programmes. It turns out that the foundations for a personal carbon trading scheme already exist: setting a limit on personal emissions, emissions accounting, rewards or penalties according to performance relating to reduction targets. Only the emission trading remains marginal.

The implementation of a mandatory personal carbon trading scheme means surmounting different types of obstacles. The principal issue at stake is the social acceptance and appropriation of a scheme put into place by public authorities, and applying to all the adults. The availability of low carbon products and services is equally a prerequisite. Finally, a degree of political courage is necessary.

The implementation of a carbon tax in France, provided for the 'Grenelle 1' law of August 3rd, 2009, now depends on the establishment of an EU frame. This requires the unanimity of the EU member states whereas several states are opposed. Personal carbon trading can be considered as an alternative to a carbon tax. It follows the same objective of reducing diffuse emissions. It also guarantees emissions reductions, which a tax does not. The WTO and the UNEP (2009) considered that a cap and trade scheme could be preferable when the certitude of a result for the environment is necessary. This is the case for climate change considering the irreversible ceiling of global warming of about 2°C compared to pre-industrial values. The advocates of personal carbon trading have also underlined the advantage in terms of the visibility of individuals' emissions, which can work as a lever for changing the individuals' behaviour. Defining the same emissions reduction target for individuals would allow an equitable contribution to climate change mitigation. This method appears to be fiscally progressive since an equal allocation of carbon credits would give place to financial transfers from higher income households, who generally have higher than average emissions, to lower income households. It could also stimulate the demand for low carbon products and services, which would favour their profitability.

Personal carbon trading is sometimes described as a rationing instrument. Beyond its connotation, the term rationing is not adequate because it refers to the idea of a fixed limit on personal emissions. The overall volume of authorized emissions would be capped, but the carbon budgets allocated to individuals would be flexible. Exceeding these budgets would be authorized as long as they are compensated by the acquisition of additional carbon credits. Conversely, people who would have not used all of their carbon credits could save, give or sell them. It must be underlined that it is the emissions that are limited, and not consumption in itself. A personal carbon trading scheme covering emissions associated with residential and transport energy consumption for example, would not install a restriction on consumption and travel in a strict sense. It would create an economic incentive for the adoption of low-carbon modes of transport, heating and electricity and hence save fossil fuels (petrol, gas, coal). Individuals would need to organize themselves in order to manage their carbon budgets according to their priorities and possibilities. Fears are sometimes voiced about the advent of 'Big Brother'. The objective of personal emissions accounting with the use of cards or other ICT is to collect data on the carbon value of purchases made by individuals and not information on the purchases themselves. Only the carbon footprint of purchases would be recorded on an account created specifically in order to measure personal emissions. This is personal data nevertheless, whose protection must be guaranteed.

Personal carbon trading could constitute a serious option when ineffectiveness of existing policies to reduce the individuals' emissions is acknowledged (Bird *et al.* 2009). In the mean time, experimenting with this instrument that has not yet been established may prove useful before its establishment on a national level. Notably a better understanding of its technical aspects and social appropriation is required.

A 'learning by doing' approach could consist of establishing schemes based on granting rewards if CO₂ emission reduction targets are met. These targets could correspond to the average of current household CO₂ emissions, possibly reduced by a certain percentage. This approach presents the advantage of developing accurate and reliable methods for measuring personal emissions. It might favour public appropriation of a new scheme aiming to raise awareness of environmental impacts and encourage their reduction. The absence of sanctions if the emissions reduction targets are not reached could facilitate the social acceptance of the scheme. Different existing programmes already follow this "save and earn" approach. This type of scheme should focus on emissions that can be easily and accurately measured and counted, meaning those associated with residential and transport energy consumption. Including other emission sources could help test and hone the calculation methodologies and measuring tools for carbon contents of basic consumer goods.

A "save and earn" scheme established on a national level could eventually evolve into a personal carbon trading scheme. Individuals would then need to manage the carbon credits they were allocated to cover their emissions. Credits would be surrendered according to the carbon content of certain purchases and could be traded according to how the individual carbon budgets are managed.

Domestic personal carbon trading schemes of credits could be linked together in the long run (Government Office for Science 2010). Linkage between such schemes would promote the construction of a global carbon market. Individuals' emissions would be counted in countries where the purchases are made, and the carbon credits to be surrendered would be debited from the carbon account opened in the individuals' country of residence. The risks of purchasing carbon intensive products and services in countries that have not established these types of measures, which would limit the efficiency of a national system, would be lessened. Nevertheless, this would necessitate a common and coordinated approach between several states.

6. Table of existing programmes surveyed

Type of programme	Programme name	Programme carrier	Location	Annex number	Monitoring scheme	
					Monitoring overall spending	Monitoring exact GHG emissions and/or sustainable consumption
CO2 emissions accounting and reduction	Allocation of carbon budgets					
	Carbon rationing	CRAGs	UK	1.1.		X
	Comptabilité CO2	Nature & Découvertes	France	1.2.		X
	CarbonLimited	RSA, LGiU	UK	1.3.		X
	PACT Scheme	WSP Group	UK	1.4.		X
	Incentives for reducing emissions below a baseline					
	MyEEx	Myemissions Exchange	USA	1.5.		X
	Compte carbone	MyCO2	France	1.6.		X
	Volontaires pour le Climat	Objectif Climat	France	1.7.		X
	Climate Bonus	VATT	Finland	1.9.		X
Carbon offset	Offset according to the cardholders' emissions					
	Mon Noël Responsable	Climactis, Villière	France	2.1.		X
	Low-carbon credit card	Everbright Bank; Beijing Environment Exchange	China	2.2.		X
	Carbon Capital Fund	National Forest Foundation	USA	2.3.		X
	Rabocard	Rabobank	Sweden	2.4.		X
	ClimaCount	Repay International	NL, EU	2.5.		X
	Offset according to the card use					
	Brighter Planet Card	Brighter Planet, Bank of America	USA	2.6.	X	
	Cart'étincelle	5Continents	France	2.7	X	
	GreenPay MasterCard	Fintura Corporation, Metabank	USA	2.8.	X	
	Eco Mastercard	GE Money	Australia	2.9.	X	
	ReDirect Guide Visa	ReDirect Guide, Shore Bank Pacific	USA	2.10.	X	
	Carte de crédit Visa Triodos	Triodos Bank	Spain	2.11.	X	
	Support for sustainable consumption and behaviour	Support according to purchases and behaviour				
De e-portemonnee		Bond Beter Leefmilieu; Limburg.net	Belgium	3.1.		X
Meilleur pour ma planète		Bricomarché	France	3.2.		X
Coop MedMera card		Coop	Sweden	3.3.		X
consoGlobe		consoGlobe	France, Belgium	3.4.		X
LA CARTE		E. Leclerc	France	3.5.		X
GreenCommerce		GreenCommerce	France	3.6.		X
Community Card		Interra	USA	3.7.		X
LACARTE		Monoprix	France	3.8.		X

	Green Clubcard	Tesco	UK	3.9.	X
	Eco Rewards	UMB	USA	3.10.	X
	SUCCESS	Belfast	North West Europe	3.11.	X
	Umwelt Plus Karte	Heidelberg	Germany	3.12.	X
	Live Green Membership card	Toronto	Canada	3.13.	X
	Support according to card use				
	Green Rewards	Green Rewards	UK	3.14.	X
	Wells Fargo Rewards	Wells Fargo	USA	3.15.	X
	WorldPoints Rewards	Bank of America	USA	4.1.	X
	Breathe Credit Card	Barclays	UK	4.2.	X
Donations	Charity Credit Card	Co-operative Bank	UK	4.3.	X
	Carte Agir	Crédit coopératif	France	4.4.	X
	Carte Bleue Visa ; Green credit card	HSBC	France, HK	4.5.	X
	Cartes caritatives	La Banque Postale	France	4.6.	X
	Avantage	LCL	France	4.7.	X
	Cartes Collection caritative	Société Générale	France	4.8.	X
	Carte Truffaut	Truffaut	France	4.9.	X
	KeyClub Bonus Program	USB	Switz- zerland	4.10.	X

Annexes: Presentation of existing programmes surveyed

The programmes surveyed are classified into four categories:

- CO2 emissions accounting and reduction (annexe 1)
- Carbon offsetting (annexe 2)
- Support for sustainable consumption and behaviour (annexe 3)
- Donations (annexe 4)

Only the first three categories take individuals' CO2 emissions and/or sustainable consumption into account. They often include a charity element similar to the donation programmes.

The programmes are presented by category and in alphabetical order by name of the programme sponsor. Certain programmes could fall under more than one category. In this case they are listed according to their key objective.

Annex 1: CO2 emissions accounting and reduction

Schemes based on carbon emissions accounting and reduction are the most recent among the programmes surveyed.

The emissions of individuals who take part in these programmes are measured either manually or automatically. Emissions can be counted by the individuals themselves using tools such as carbon calculators. They can also be recorded with ICT such as cards or smartphones.

Reducing personal emissions can take two forms: carbon allowances, where staying within or surpassing the limit can result in either a reward or a penalty; setting a target for carbon reduction which can result in a reward if reached.

An account is opened in the name of each participant. The emissions generated by the account holders are recorded along with any carbon credits they might retain.

1.a: Allocation of carbon budgets

1.1. Carbon rationing

Programme carrier: **Carbon rationing action groups**

Programme name: *Carbon rationing*

Location: UK initially, gradual extension to other countries

<http://www.carbonrationing.org.uk>

Type of programme: carbon budget allocation

What the programme consists of:

CRAGS (Carbon Rationing Action Groups) is a network of individuals convinced of the necessity of contributing to the fight against climate change and who commit themselves voluntarily to this goal. This network was started in 2006, and has spread progressively in the UK as well as in other countries.

The CRAGS programme is formed of groups of people determined to reduce their personal and collective carbon footprint, and who support and encourage each other in this aim. The groups decide to monitor their emissions, agree on a reduction target and share their experiences with the different methods and actions that allow them to lead low carbon lives.

The groups are diverse. They can be gatherings of friends, people from the same local groups (work place or neighbourhood for example), or connections made via the CRAGS website. Group sizes vary also, although the majority are small (10 or so members).

Scope:

- Sector-based scope:

The programme essentially covers CO2 emissions attributed directly to personal activity: residential energy use (heat and electricity) and transport (road and air). The scope can be enlarged, through the possibility of including public transport. Indirect emissions are sometimes counted. Certain groups wish to include food and beverage consumption.

- Geographical scope:

Groups were formed gradually. The programme's internet site lists 32 groups (active or newly formed) in the UK, five in the US, two in Canada and one in China.

Method for determining personal carbon budgets:

A carbon budget, or carbon “ration”, is set for each year. It is progressively reduced. The annual emissions reduction target to be reached is determined by group, and can vary between the groups. This target is set according to the previous year’s carbon footprints of each individual in the group. It is always inferior to the previous year’s emissions level, and is set for a fiscal year.

Method for emissions accounting:

Emissions for the year in progress are counted with household utility bills and transport receipts or estimations. Each member of a group can count their emissions, or delegate a “carbon accountant” for the group.

Emissions accounting uses emissions receipts. They are based on fossil fuel consumption. Different methods are available on the programme’s website. It is up to each group to define the method which seems the most appropriate among the following: manual accounting based on an emissions factor table, accounting based on energy consumption data or emission receipts, accounting based on online calculators and energy bills.

Reward and penalty mechanism:

Reward and penalty mechanisms applicable at the end of the year are defined by each group. In most cases, a value is set for emissions which are superior or inferior to the allotted carbon budget. This value is around 4 or 5 pence per kg of CO₂. The sums collected are deposited onto a “carbon fund” established by each group, and are used according to the terms defined by the members. A ceiling can be fixed on penalties to be paid if there is a carbon budget deficit. Only rewards can be guaranteed in some groups.

1.2. Comptabilité CO₂ (Carbon accounting)

Programme carrier: **Nature & Découvertes**

Programme name: *Comptabilité CO₂*

Location: France

http://www.natureetdecouvertes.com/progres-durable/comptabilite-co2

Type of programme: allocation of carbon budgets for employee work related emissions.

Scheme reference: ADEME’s Bilan Carbone (carbon balance) method

**What the programme consists of:**

In 2007 Nature & Découvertes started carbon accounting in order to measure the CO₂ emissions linked to their business and find solutions to reduce them. The objective is to disassociate CO₂ emissions from economic growth.

Since 2008, a CO₂ budget is set at the beginning of each year. It establishes the emissions limits for each sector (merchandise transport, personnel, bags, energy, etc). The overall carbon budget, along with its sector divisions, is determined according to the previous year’s emissions.

Measures have been put into place by Nature & Découvertes to enable them to stay within these limits. They are to help manage emissions at the headquarters and in stores. Some measures are aimed at customers and staff (bags and catalogues/publicity). A sensitizing campaign of considerable scale is underway.

Emissions Accounting Methods:

Emissions are measured according to ADEME's Bilan Carbon method. They are calculated every three months in order to regularly monitor their progress and identify the means of controlling them if they increase. This enables CO₂ emissions to be compared from one year to the next and budget requirements to be checked.

Emissions linked to each employee's (headquarters and stores) transport are measured. They cover business travel and commutes between home and work. A "CO₂ receipt" for each trip is to be filled out for this purpose. The commutes between home and work are measured twice a year. Visitors to the headquarters are encouraged to fill out a questionnaire concerning their trip there and the means of transport used.

1.3. CarbonLimited

Programme carrier: RSA - LGiU

Programme name: CarbonLimited

Location: UK

<http://www.rsacarbonlimited.org>

<http://www.carbonlimited.org.uk>

Type of programme: carbon budget allocation

Scheme reference: CO₂ data from the ActOnCO₂ calculator

What the programme consists of:

CarbonLimited, founded in January 2006 for a three year duration by former Secretary of State for Environment, Food and Rural Affairs, David Miliband, was developed by the Royal Society for the Encouragement of Arts, Manufactures & Commerce (RSA). This programme is now a part of LGiU (Local Government for Information Unit), a think tank specializing in local administration.

First implementation period (2006-2008):

The objectives of RSA CarbonLimited were the following: research on personal carbon trading (definition, conception, economical and social impact) and development of prototypes to test the system. Both the management of personal carbon budgets accredited to online carbon accounts and emissions monitoring by card were tested.

Method for allocating personal carbon budgets:

A platform containing the carbon accounts took the form of an online demonstration in October 2006, before being tested in 2007 by voluntary participants (4,800 in total). Given the name CarbonDAQ, this platform was developed by Money Swap, specialists in online currency trading.

Carbon budgets were allocated to participants each month. The budgets covered CO₂ emissions related to residential energy usage and personal transport (car and aeroplane). The allowance sum was 420 kg, consisting of 42 carbon units which represented the right to emit 10 kg of CO₂. The annual quota was 5 tonnes of CO₂ a year, which corresponded to roughly half the British household emissions average. Participants however could determine their target, which could be higher than 420 kg of CO₂ per month. They could also choose the duration of their participation in the programme.

Methods for emissions accounting:

Emissions accounting was carried out via declarations of energy consumption. The account holders calculated their emissions each month using the RSA CarbonLimited website's calculator. This calculator used CO₂ data approved by the government (ActOnCO₂ Calculator).

A carbon card pilot programme was developed in partnership with Atos Origin. For five months (June to November 2008), the aim was to prove that it was possible to use existing IT infrastructures to put a system of personal carbon trading into effect electronically. The goal was also to test the technology, the rate of usage and the effectiveness of the device. The experiment covered CO₂ emissions associated with personal road travel. Carbon account holders used cards to count their emissions through their fuel purchases in BP petrol stations. The Nectar card, the most widely used loyalty card in Great Britain, served as a carbon card. Linked to the carbon account, the card allowed the account holder to deduct the amount of fuel purchased from their carbon allowance. 130 people took part in the experiment which could accommodate up to 1000 volunteers.

Carbon trading mechanisms:

Participants could trade carbon units online, according to their carbon account balance. The unused carbon credits were put up for auction against virtual money. The price for a ton of CO₂ varied from 77 to 88 pounds sterling between September and November 2008.

Second implementation period (2009-):

The RSA Carbon Limited final report underlines the advantages of a cap and trade system for reducing individual emissions, in spite of the obstacles that its implementation might face: double counting emissions because of the overlap with the EU ETS, scepticism in public opinion due to aspects related to equity and recourse to the market (Prescott 2008). The introduction on a local level of a scheme based on voluntary participation is seen as a means to make advances in the field. New forms of trading can be explored on a local level (business, community groups and all groups of people in general). The Carbon Limited programme has since become a part of the LGiU (Local Government Information Unit).

Carbon trading simulation:

LiGU developed in 2008 an online carbon trading simulation tool geared towards communities. This tool is designed for local authorities, the public sector as well as other communities such as schools or universities. It was initially designed to permit these groups to prepare for and comply with the Carbon Reduction Commitment established by the climate change law in 2008. This device is a mandatory cap and trade system that covers from April 2010 the emissions of around 5000 large organizations from the public and private sector (banks, supermarkets, cinemas, hotel chains, universities, local groups). Two tools were specifically developed for local authorities and the public sector: Carbon Trading Councils and Carbon Trading Public Sector. They allow the users to measure their emissions and appropriately manage their carbon allowance, including carbon trading amongst themselves.

Terms for individual participation in emissions trading in local markets:

The LGiU enlarged the scope of its virtual emissions trading system and proposed to local authorities a model applicable to communities (schools, churches, neighbourhoods, etc) Community Carbon Trading is a simulation tool which enables authorities to encourage the different communities present within them to participate in meeting emissions reduction targets. It is presented as an evolution of the personal carbon trading model.

The reasoning behind Community Carbon Trading is the same as that behind the tools developed to prepare for the implementation of the Carbon Reduction Commitment. It favours the development of a framework for emissions trading on a local level, applicable to an ensemble of communities. It allows group members to collectively reduce their CO₂ emissions, compare their performances with other groups, and trade emissions rights with other groups.

Setting carbon budgets plus the allocation and trading of emission permits is real, but virtual money is used. Local authorities attribute a reward at the end of April to the groups with the best performance. The aim of the reward, which is defined by local authorities in conjuncture with the groups, is to recognize the efforts made by communities and to encourage more reductions.

Local authorities and the participating communities determine together the targets for reducing the emissions linked to energy consumption, on the basis of their past emissions. It can refer to the group's carbon footprint, measured with the calculator developed by Carbon Trust, or to that of individuals in the group, calculated using the Act on CO2 calculator for individuals. Reduction targets are set according to the current average emissions of each group. Emission rights are distributed for free or by auction. They are traded between groups and not between the individuals who make up the groups. The role of the individuals consists in reducing their emissions in order to help their group stay within its carbon budget. They measure and declare their emissions to the group's representative who reports to the local authority.

Climate Clubs, similar to Community Carbon Trading, are offered to groups of people who wish to create their own emissions trading scheme but who aren't included in the aforementioned case which involves participation with a local authority. Inauguration is planned for September 2010.

Subsequent extensions of a reward system are being considered. A reward could be attributed not only to groups who perform best in reducing CO2 emissions, but also to individuals who perform best within each group.

1.4 PACT Scheme

Programme carrier: **WSP Group**

Programme name: *PACT Scheme*

Location: UK; gradual extension to other countries

Type of programme: allocation of carbon budgets for employee non-work related emissions.

Reference scheme: emission factors recognized by the public authorities in the country where the programme is implemented



What the programme consists of:

The London-based WSP Group is an international engineering and management consultancy firm that integrates sustainable development in its activity. Its strategy for sustainable development is implemented both in the services provided to clients as well as within its internal business. Employees are encouraged to reduce their emissions in the workplace through a set of different measures; using video-conferencing is one example. It was in this context that PACT (Personal Allowance Carbon Tracking) was launched in October 2007 and implemented in the beginning of 2008.

PACT is the first business-led personal carbon budgets scheme geared towards employees. The aim is for the employees to become conscious of the carbon footprint of their daily activities and encourage them to reduce it through behaviour changes. The programme's launch was facilitated by the fact that environmental and sustainability issues are central to the work of the WSP Group.

Scope:

The programme covers the employees direct emissions generated in their private lives: residential energy usage, personal transport (all modes combined), including work commute and international travel.

Participation in the PACT programme is voluntary. 25 employees of the group took part in 2008, around 80 in 2009 and 750 in 2010. The sharp increase in the number of participants in 2010 was due to the opening of the programme to other countries where the WSP Group is implanted: South Africa, Germany, Australia, Saudi Arabia, the United States (in some states), and Sweden.

Method for allocating personal carbon budgets:

A carbon budget is given to each participant to cover their emissions. The allowance is the same for everyone. It varies however depending on the size of the participant's household; the carbon provision is multiplied by the number of people (including children).

The carbon budget allocated for the first year was 6 tonnes of CO₂, and was reduced by 0.5 tonnes per year (5 tonnes in 2010). The initial budget was determined in consideration of the national emissions average (4.5 tonnes). It was relatively high at the launch of the programme. The aim was to encourage employees to take part in the PACT scheme by beginning with an easily attainable target.

The carbon allowance set for employees of WSP Group offices in other countries can vary. The provision for employees living in Great Britain is the same as those who live in Australia for example. But it is higher than that set for Sweden, and lower than that set for the United States (14 tonnes in some states). The reasoning behind the differences in carbon allowance for different countries is the same as that used in determining the initial carbon allowance for Great Britain: the programme needs to be sufficiently motivating to elicit participation

Method for emissions accounting:

An Internet site was developed for the implementation of the PACT programme (www.wsppact.com). An account is opened for each participant. It includes their annual carbon budget, a questionnaire to fill out every trimester for their emissions accounting and a graph showing the consumption level of their carbon allowance and the contributing emission sources.

The questionnaire to be filled out, in order to measure and declare emissions, is based on the emission factors recognized by the public authorities in each country where the PACT system is implemented. It contains detailed columns for each emission source so that the calculation of the carbon footprint can be as accurate and reliable as possible.

The emissions declared by the participants are not verified after the fact; the PACT scheme is based on trust.

Reward and penalty mechanism:

The reward and penalty mechanism applies at the end of each year in relation to performance regarding the personal carbon allowance. Each kg of CO₂ emitted in quantities above or below is valued at 5 pence. A ceiling for the reward and penalty is set at 100 pounds sterling.

Those whose emissions are higher than the limit have to pay a penalty, which is deducted from their pay. Those whose emissions are lower than the limit have the choice between receiving a reward (financed by the penalties) and donating it to a charity. The second option is the most frequently chosen.

Gradual extension of the programme:

- Geographic extension:

The PACT system was extended in the beginning of 2010 to other countries where the WSP Group is implanted. It should continue to expand throughout 2010 due to launches by third parties. A committee was formed to bring the different organizations together. It includes large companies like Cisco UK and Invensys Rail and also smaller companies located in Great Britain and other countries (Saudi Arabia, for example), as well as neighbourhoods in London. Organisations that are interested can obtain a programme license developed by the WSP Group to set up the programme for their employees. They set the carbon allowance allocated to

their employees and define the reward and penalty mechanism. The possibility of only awarding rewards is envisaged.

- Sector extension:

The inclusion of emissions linked to the consumption of basic consumer goods is possible in order to allow employees to be aware of their overall carbon footprint. Two goals for the programme are user-friendliness and emissions data precision. Emissions accounting for food for example can be performed at the time of purchase, but it would not be sufficiently accurate. No decision has been made on the subject for the moment.

Additional mechanism:

A monthly electronic newsletter, containing advice and interviews about reducing emissions, is sent to each participant.

Partnerships are also developed by the WSP Group to allow employees to manage their emissions. One partnership was recently started with an electric company that uses renewable energies, which offers advantageous rates to PACT participants.

The accounting mechanism for emissions, matched with the reward and penalty mechanism, favours behaviour changes such as changing one's car, work commute, ways of using appliances at home, etc. PACT participants form a group in the network of CRAGS (Carbon rationing action groups).

1.b: Incentives for reducing emissions below a baseline

1.5. MyEEx

Programme carrier: **My emissions exchange**

Programme name: *MyEEx*

Location: US

<http://www.myemissionsexchange.com/>

Type of programme: incentive to reduce emissions below a baseline

What the programme consists of:

My Emissions Exchange, or MyEex, is a personal emissions trading programme launched in March 2009. It aims to incite individuals to reduce their carbon footprint by granting financial rewards for emission reductions.

The MyEEx programme, whose slogan is "measure, reduce, earn," follows the strategy of emissions reduction projects. It allows individuals to generate offset credits, and earn money by selling those credits on the carbon market.

Scope:

Only home energy use is considered by MyEex because it is the easiest to measure. The extension of the programme to include travel and daily consumption is being considered.

The programme is open to all individuals who wish to take part. Participants living outside of North America currently only receive estimates of their carbon footprint and their emissions reductions. Earnings for reductions will only be attributable when the weather data for the different continents becomes available.

Methods for measuring emissions:

Measuring CO₂ emissions involves determining a baseline emissions rate as well as the reductions made in relation to that rate. The baseline corresponds to emissions generated by participants in the past 12 months. The MyEex website contains numerous tips on reducing energy use (next to each tip is listed the amount of savings in CO₂ and money that would entail). Reductions are measured throughout the year on a monthly basis. They are verified and certified by MyEex, which issues the equivalence in carbon credits. The credits are VERs (Voluntary Emissions Reductions), sold on the voluntary carbon market through the intermediary services of OceanConnect, an international brokerage firm that specializes in energy, partnered with MyEex.

MyEex deposits the proceeds of the carbon credits sales on the market onto a PayPal account for the participants minus a 20% commission fee. The sum depends not only on the amount of emissions reductions achieved but also on the fluctuations of the carbon market. No penalty is applied in the absence of emissions reductions.

What individuals do:

People interested in the programme register for free on the MyEex website. There is no emissions reduction minimum to be achieved to be eligible for the programme. The reduction of at least one tonne of CO₂ is nevertheless required to generate a carbon credit.

Each member is prompted to fill out their emissions profile by providing data concerning their household's electric and heat use over the past 12 months (to determine their baseline) and each month of the current year (to determine the emissions reductions). The data includes the type of energy consumed, the manner in which the consumption is measured, the frequency of the utilities bills and the data present on the bills. Copies of the bills are uploaded via the MyEex website in order to have the past and present emissions verified. In the case of a lost bill, the member is to request a new copy from the energy provider. The emissions are verified and certified on the base of these documents.

Members who have reduced their emissions receive a sum corresponding to the market sale price of the carbon credits deposited in their personal PayPal account. In the future, the possibility of permitting members to donate their credits to the recipients of their choice, or to use them to compensate their transport or other specific projects, will be envisaged. The idea would be to encourage members to reduce their carbon footprint and to offset residual emissions.

1.6 Compte Carbone (Carbon Account)

Programme carrier: **MyCO₂**

Programme name: *Compte carbone*

Location: France

<http://www.myco2.com>

Type of programme: incentive to reduce emissions below a baseline

Scheme reference: ADEME's Bilan Carbone (carbon progress report) method emission factors; methodologies defined by ADEME and AFNOR for carbon labelling; labels

What the programme consists of:

MyCO₂ is a company that develops tools to make people aware of the carbon footprint of their purchases and incite them to adopt behaviour which respects the environment in order to reduce their overall footprint, namely carbon. These decision-making tools for individuals support new industries by favouring the purchase of low carbon products and services.

The Carbon Account programme developed by MyCO₂ consists of CO₂e emissions accounting through the means of monitoring purchases made. The carbon counting system is joined with a

financial incentive mechanism, "GreenPoints", in order to stimulate environmentally-friendly consumption and behaviour.

Scope:

The Carbon Account programme covers CO₂ emissions associated with energy consumption in transport and the home as well as daily regular consumption. Its aim is to gradually extend for measuring the consumption of other natural and non-renewable resources such as water and biodiversity. Different lifestyle impacts on the environment could then be measured.

Methodology for measuring emissions of products and services:

The carbon account programme relies on MyLifeCycle®, a database developed by MyCO₂. This database contains the carbon footprint of different products and services offered to consumers.

Carbon footprints are determined using methodologies validated by public authorities. A distinction is made between direct emissions (energy consumption in transport and the home) and indirect emissions (basic consumer goods).

- the emission factors of the Bilan carbone (carbon progress report) method of ADEME are used to calculate the emissions associated with purchases of transport, heat and electricity related services.
- the calculation methods defined by the ADEME/AFNOR platform for the environmental labelling of widely consumed products are used to calculate emissions associated with the purchase of basic consumer goods.

Focusing on basic consumer goods, the MyLifecycle database combines data obtained from generic and specific life cycle analyses (LCA) for each product. Information provided by manufacturers, distributors and retailers is added to the data. Data is given a confidence index which varies in function with the accuracy and reliability of the information available. The data also includes other environmental impacts (water, toxicity, biodiversity, etc.).

Research is being done, notably in partnership with the Ecole Centrale Paris, to monitor the quality of the information collected in the database. Work is also being done in cooperation with retail chains to determine together the environmental impact of products and services offered to consumers. This provides a means for companies to become aware of the emissions associated with their products and identify means of reducing them. Cooperation with the company Nature & Découvertes, for example, has focused on electric and electronic products in its line.

Methods for emissions accounting:

Participation in the MyCO₂ programme is voluntary. An online carbon account is opened for each participating household. This account allows participants to follow their personal CO₂e emissions in real time as purchases are made. The emissions data recorded onto the account is collected automatically, after a first stage where it is declared manually. Both automatic and manual collections of data are based on exchanges between personal carbon accounts and the MyLifecycle database.

- Automatic recording of purchases:

This type of emissions accounting relies on the use of information and communication technology (ICT) as data carriers linked to carbon accounts. Their use is facilitated by multichannel displays of environmental information relating to purchases. These were developed in partnership between MyCO₂ and Wincor-Nixdorf, as well as partnerships developed with different retail chains.



Card use provides advantages for the automatic collection of data. Any type of card equipped with an “ecological counting” application can serve as a carbon card, called Card for environment. It can be a credit card, loyalty card, or debit card. Other technologies are also being considered such as smart grids and smart phones.



- Manual declaration of purchases:

This mode of data collection consists of participants recording their purchases on their carbon accounts themselves. The account holders can manually report their purchases, or download EAN bar codes of those purchases after having recorded them with a cell phone.

The emissions of the Carbon Account participants are cumulated and classified under the principal household expense items. Individuals can consult their carbon footprint and identify means for its reduction.

The emissions of participants are compared to those generated over the previous year, to the current average, as well as to the national emissions reduction target for 2050 divided on an individual level.

Financial support system for emissions reductions:

A financial support system aims to encourage behaviour changes through rewards. These rewards come in Greenpoints. They can be redeemed for gifts or discounts on other “green” products or services, or donation to sustainable and charity organizations. The idea is to create a virtuous circle of responsible consumption.

Greenpoints can be obtained in two ways:

- When the overall CO₂ emissions of carbon account holders are lower than an indicated target: Greenpoints are granted according to the reductions obtained by the individuals compared to that target.

- At the moment of purchase of specific “green” products or services: goods are doted with recognized ecological labels, or equations which show that they are better than average in their category on a number of environmental and societal criteria.

The conditions for the allocation and spending of GreenPoints are defined by a charter developed by MyCO2. This charter particularly stipulates that proofs of purchase or certificates are needed before GreenPoints can be awarded. Recording purchases with a Card for environment is a means to certify that purchases were made.

Carbon Account Experiments:

MyCO2's objective is to test the Carbon Account programme within pilot projects, in partnership with local authorities and suppliers. These projects can cover direct and indirect personal emissions. They help to contribute to the research carried out by MyCO2 by offering a testing ground to verify the hypotheses and solutions developed.

The Alliance MyCO2, bringing together private and public organizations with scientific, technological, and environmental experience, is being developed.

1.7. Volontaires pour le Climat (Volunteers for the Climate)

Programme carrier: **Objectif Climat**

Programme name: *Volontaires pour le Climat*

Location: France

<http://www.myemissionsexchange.com/>

Type of programme: incentive to reduce emissions below a baseline.

What the programme consists of:

The programme “Volontaires pour le climat” (Volunteers for the Climate) was launched in 2009 by Objectif Climat, a non-profit organization from the Alsace region, based in Strasbourg. Its objective is to make people aware of climate change and give support to those who wish to be helped with their efforts to reduce their climate footprint by 3% annually (objective to reach the national target of dividing the greenhouse gas emissions by a factor 4 by 2050). 130 households were involved in the beginning. The participants are split into groups.

Participation in the programme lasts for a period of two years and consists of 4 stages: presentation of the energy and climate issues, the impact of individuals; presentation of tools and methods used by members during their participation; meetings every trimester where different methods for reducing lifestyle emissions are evoked and shared; evaluation of the measures taken.

Certain local authorities and territories in the Alsace region facilitate the implementation of the programme by lending financial support (a modest sum) or logistic support (lending rooms for meetings, for example).

Scope:

The Volunteers for the Climate programme covers all of the emission sources of individuals: residential and transport energy consumption, basic consumer goods.

Method for emissions accounting:

Participant's emissions are calculated when they register, in order to determine their initial carbon footprint, and then every three months to assess their progress.

The personal Bilan Carbon mechanism developed by Manicore is the method used for emissions accounting. This tool was re-adapted however for the programme implementation.

This was done for two reasons: the mechanism was neither adapted for a household approach nor for a trimester assessment of emissions.

A progress report log is to be available in the future. This carbon account was initially developed as an Excel document and should soon be accessible on the Objectif Climat's website.

Programme progress report:

Objectif Climat's initial ambition was to get 500 Alsace residents involved. 130 households volunteered at the launch of the programme, which is now fully underway. Participants live in urban and rural settings. They are employed or retired. Some have children, some do not. There was no pre-selection.

The assessment of the first groups of participants halfway through the programme was judged to be satisfactory. Each of the participants had modified their behaviour towards reducing emissions. The measures taken were diverse and varied (eco-driving, joining an AMAP (an organization to promote small scale agriculture and organic farming), choosing local products, reducing meat consumption, etc.). Some measures are made advantageous through discounts given to participants.

1.8. Climate Bonus

Programme carrier: consortium of public (including VATT), and private organizations

Programme name: Climate Bonus

Location: Finland

URL: <http://www.myemissionsexchange.com/>

Type of programme: incentive to reduce emissions below a baseline

What the programme consists of:

Climate Bonus is a research and development project that aims to assess the possibilities and effectiveness of a system which incites consumers to reduce their carbon footprint, and incites suppliers to offer more low carbon products.

Different objectives are pursued: determining carbon footprints for products and services offered to consumers and displaying this environmental information, overall individual carbon footprint accounting through monitoring the emissions relating to purchases, rewarding individuals who reduce their emissions.

The following results are desired: developing reliable data acquisition and co-ordination strategies for measuring the carbon footprints of purchases, developing a demonstration version of an information system for consumers concerning the carbon footprint of their purchases, testing the usability and feasibility of the system, evaluating the system's economic and environmental impact, identifying prerequisites for the development of the system on a larger scale, recommendations for various partners and interest groups.

A consortium of partners was formed for the implementation of the Climate Bonus project. It includes research centres (Government Institute for Economic Research (VATT), National Technical Research Institute (VTT), Finnish Environmental Institute (SYKE), MTT Agrifood Research, National Consumer Research Centre), private partners (Keso, Elisa, HK Ruokatalo, Nokia, Stora-Enso, Tuulia International), and the Finnish Technology and Innovation Agency (TEKES). Each partner co-finances the project with TEKES making the largest contribution.

The programme was implemented for an initial phase of 16 months, from January 2008 to April 2009. This initial phase included a four week trial of the demo version (January and February) by a limited number of users. A second phase is in process.

Scope:

The programme concentrates on household CO₂e emission sources: residential and transport energy consumption (personal cars and public transport) and basic consumer goods. Focus was placed on researching methodologies to measure the emissions associated with foodstuffs.

Methodologies for measuring emissions of products and services:

Different methodologies are used to determine the carbon footprint of products and services. However, data accuracy and reliability are required, especially for the foodstuffs (the main research objective of Climate Bonus).

The postulate is the following: the more accurate the carbon footprint for goods is, the more the system is capable of offering consumers options for comparing between goods while guaranteeing reliable emissions monitoring. However, as consumers currently only have limited knowledge of GHG contributors in their shopping carts, even general information concerning the emissions for products and services can offer advantages. Data with only relative accuracy can consequently be used in the first stages, even if the quality needs steady improvement.

- Foodstuffs:

Different methodologies for measuring emissions associated with these products are used in the programme's framework. Part of the data is obtained from complete life cycle analyses (LCAs); most of the data is obtained from hybrid LCAs (LCA combined with an input-output analysis based on the incoming and outgoing cash flow of the different economic sectors). The rest of the data is obtained from input-output analysis to reinforce the precision of the partial estimations. Complete LCAs are considered necessary but not sufficient for producing reliable data. Complementing the data with information from the manufacturers, in line with a common protocol, is envisaged as a way of guaranteeing the accuracy, reliability and comparability of the LCA results.

- Residential and transport energy use, other basic consumer goods:

Carbon footprints of products and services are determined using data on the intensity of the emissions of different activities as well as the corresponding emission factors. Data generated by online carbon calculators, such as those proposed by some service companies, can be used in certain cases to get more reliable estimations.

Methods for personal emissions accounting:

Emissions accounting is performed both manually and automatically. The demonstration version of the consumer information system for footprints of purchases was tested for a period of 4 weeks from mid-January to mid-February 2009. This system allowed individual volunteers to monitor and declare their emissions. The objective was to test, in real circumstances, the system's operation procedures, usability, and adoption by consumers.

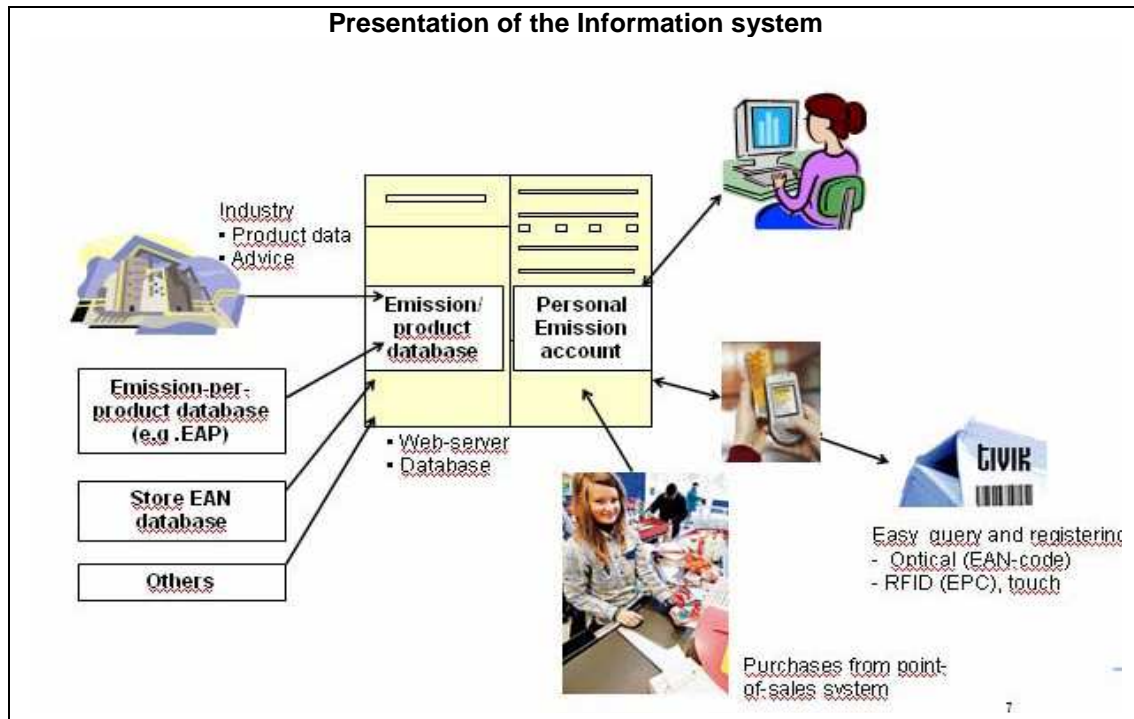
- Automatic purchase recording:

This mode of data collection only concerns foodstuffs bought in participating retailers (ten K-supermarkets in three regions: Helsinki, Torku and Joensuu). Data is obtained via a nutrient analysis code system developed by Tuulia International in cooperation with VTT. The data is collected through the retailer's point of sale system and transmitted to a database containing the participants' emission accounts. Certain additional information (type of product, weight, etc.) is automatically recorded with the K-supermarket loyalty card at check-out.

- Purchase declaration by individuals:

Two declaration modes are possible: recording EAN barcodes with cell phones and relaying information to personal carbon accounts, manually reporting data onto the accounts. In both cases accounts are accessed on the internet via a computer or smart phone.

Manually reported data includes EAN codes or specific activity data (kWh consumed, litres of fuel bought, kilometres travelled, euros spent annually, etc.). This permits counting and declaring emissions associated with foodstuffs bought in other stores, energy usage for the home and transport (including public transport), and spending for other important emission sources (clothes, personal hygiene products, household cleaning products, leisure activity, etc.).



Independent of the data collecting mode used (automated or declared), only the physical quantities (kilograms for example) of the purchases are recorded, not their price. The data is linked to precise or generic emissions associated with certain categories of products and services. The data can also be linked to emission estimates. This permits households to monitor their GHG emissions, expressed in CO₂ equivalents, classified in four consumption categories (transport, home, food and beverages, other goods and services).

The scores or indicators of each participant are compared with three statistical baselines (previous week, monthly duration, performance compared to the European Union's emissions reduction target for 2050 calculated on an individual level), and are compared to others in their groups and other groups.

Financial support mechanisms for emissions reduction:

A combination of two incentive mechanisms was initially considered: one aimed at manufacturers and retailers², the second aimed at consumers. Only the latter was chosen for the programme.

Two consumer incentive schemes were considered: a scheme for allocating tradable personal carbon credits, and a system granting rewards for emissions reductions. The second option was favoured as it was more feasible in the short term and more attractive to individuals as a reward-only incentive.

- Conception of the reward system:

The programme is based on the allocation of climate bonus points. Points are granted according to reductions in emissions made by individuals, compared to a personal baseline

² The Climate Bonus programme incites retailers to increase the amount of low carbon products they put on the market in order to reduce their annual carbon intensity of sales. It was planned to use the Kyoto Protocol mechanisms (joint implementation or clean development mechanism) so that the carbon credits are delivered for achieved emissions reductions after the emissions reduction potentials for the different stages of production were identified by audit.

predefined after the completion of a questionnaire ("business as usual" levels). This baseline combines consumption statistics for 2006, and the emissions per category of activity. The scale of reductions to be achieved depends on the baseline. The higher the baseline, the higher the amount of reductions needed to obtain a reward. Inversely, those with low emissions have fewer reductions to make. The reward is around 0,10 euros per kg CO₂e spared.

Points were calculated on a weekly basis during the pilot project. Calculations were based on the emissions intensity of purchases recorded automatically, not on the total of emissions accumulated. The rationale was all personal emissions are not reported and verified within the system.

- Purchases eligible for rewards:

Only purchases recorded automatically by card and relying on the use of a nutrient analysis code system are considered "real and verified" and are eligible for a reward. Climate points can be obtained only on the base of foodstuffs purchases in K Supermarkets that participate in the Climate Bonus programme. They were attributed only to participants from Torku and Joensuu. The Helsinki group was excluded from the incentive system. The idea was to obtain indications on the possible differentiating effect between a carbon account scheme only, or an assortment of reward options.

Recording EAN barcodes with cell phones, or manually reporting them directly onto the emissions account, allows for the collection of purchase data for specific products and link that to a product brand. However, this information does not permit the verification that the purchase was actually made. Purchases reported manually on the emissions account using methods other than the EAN code are not verifiable either. These different methods of emissions accounting nevertheless present the advantage of households becoming aware of their overall carbon footprint.

What individuals do:

35 individuals took part in the programme's trial demonstration version. The proximity of their homes or work to participating supermarkets, and the regularity of their purchases in these stores were the criteria for selection.

Volunteers had to first fill out an online questionnaire in order to define their profile (number of people, type of residence, car model, transport frequency) and their purchase and consumption habits. This questionnaire helped determine their baseline emissions.

During the one month experiment, they were asked to buy their food and beverages in participating K supermarkets to test the automatic recording. They were asked to fill out a manual emissions declaration for all other purchases.

The system was evaluated through the questionnaire and group discussions during and after the experiment. The goal was to collect qualitative data on the experiment.

Results:

- Perception of the participants:

In general, the participants found the system interesting and innovative. Measuring personal emissions was generally perceived as being a concrete means of daily monitoring the consequences of individual consumption and an aid in purchase choices. The simplicity in using the system, its being free, the quality of environmental data of purchases as well as the automatic recording of the latter, were elements which were invoked for an eventual duplication of the system. Certain reservations were made concerning the influence of rewards on behavioural attitudes. A larger offer of low carbon alternatives was requested.

- Monitoring emissions:

The number of participants was too small and the test was too experimental to get a precise quantitative analysis of purchases made and the corresponding emissions accumulated.

- Reduction of emissions:

The intensity of the overall average of emissions accumulated from foodstuff purchases was reduced roughly 5% during the 4 week experiment. There was a significant variation between households. The reward system was shown to accelerate purchase behavioural changes.

- Future prospects:

The system's effectiveness relies on three sets of factors: (1) accuracy, comprehensiveness, and traceability of the recorded emissions per good, (2) the inciting effect of the consumer emissions accounting system, (3) the deployment of the system in conjunction with the developing markets for new products.

The focus has to be on emissions relating to foodstuff purchases, and energy consummation in the home and transport (roughly 75% of GHG emissions attributable to household consumption, 35% to purchases). For certain products coming from industries under the EUETS, data production and the measuring system can be developed with a specific mechanism. Concerning energy consumed in the home and transport, it will be possible to achieve reliable carbon footprints in the future. Concerning the food sector, there is progress to be made to obtain a reliable carbon footprint. The goal for the system is to rely on increasingly accurate, reliable and comparable LCAs of products and services from one brand. This information can be supplemented with environmental labels or rules per product category.

The system's demonstration version showed that online emissions accounting services can be developed and present real advantages for consumers. Automatically recording emissions using loyalty cards or bank cards is a prerequisite for this system to be deployed on a large scale.

Annex 2: Offset

Initiatives aimed at offsetting all or part of personal GHG emissions multiplied in the 2000s. Banks often start the programmes, sometimes in partnership with private organizations.

Specifically, offsets are linked to emissions generated by the individuals. Emissions can either be calculated with bank cards or by the individual themselves. They are measured on a fixed scale in the first case, according to the sums purchased by activity sector, and in a more precise manner in the second case by using online carbon calculators.

Carbon offsets can also occur through the use of a credit card or the amount of purchases accrued on it. Many banks offer to offset the emissions of credit card holders by according financial rewards for the purchase of carbon credits. Instead of being paid in cash, gift certificates, airline tickets, etc..., rewards are used to finance emission reduction projects.

2.a. Offset according to cardholders' emissions

2.1. Mon Noël Responsable (My Responsible Christmas)

Programme carrier: Climactis - Villière

Programme name: Mon Noël Responsable

Location: France

<http://www.mon-noel-responsable.fr/carte-individuelle/>

Type of programme: offset according to cardholders' emissions

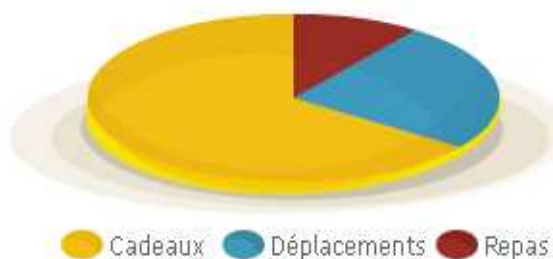
Scheme reference: ADEME's Bilan Carbone method

What the programme consists of:

Launched in 2009 by the company Climactis and the environmental printers Villière, two French companies based in the Haute-Savoie near Geneva, the programme Mon Noël Responsable (My Responsible Christmas) is a gift card for offsetting emissions associated with Christmas. This card contains a carbon offset certificate, a personalized greeting card and a recycled paper envelope.

Emissions that are offset:

The programme covers emissions from Christmas Eve and Christmas Day meals (repas), gifts offered (cadeaux) and distances travelled (déplacements). They are estimated at 200 kg of CO₂e, according to the calculation made using the Ademe's Bilan Carbone method.



Two types of cards:

Two types of cards are offered: a personal card costing 6.90 euros which offsets 0,2 tonnes CO₂e, and a family card costing 29.90 euros and offsetting 1,25 tonnes CO₂e . Part of the sums collected go to the company Climactis and are used for an emissions reduction project in the Republic of Benin.

2.2. Low-carbon credit card

Programme carrier: **Everbright Bank, Beijing Environment Exchange**

Programme name: *Low-carbon credit card*

Location: China

<http://www.ebeijing.gov.cn/BeijingInformation/BeijingNewsUpdate/t1103033.htm>

Type of programme: offset according to cardholders' emissions

What the programme consists of:

This programme was launched jointly by the Industrial Bank and the Beijing Environmental Exchange in January 2010. Its objective is to heighten society-wide public awareness of the need to save energy and reduce carbon dioxide emissions. It mainly addresses individuals, but also companies and organizations, allowing them to calculate the quantity of emissions that they generate directly or indirectly, and pay a sum to offset them. According to statistics, China's annual carbon footprint per capita is about 5.7 tonnes of carbon dioxide.

The "low carbon" credit card, equipped with basic banking functions, enables to build a carbon credits platform for individuals. It is a means for individuals to offset their emissions and attain carbon neutrality.

Emissions calculation and payment method:

An internet site was created for the purpose of calculating annual personal carbon emissions. Cardholders then voluntarily buy carbon credits on the market. These carbon credits are issued from energy conservation and emission reduction projects that meet international standards.

The quantity of carbon emissions to offset as well as the price to pay for these emissions, are determined ahead of time. The quantity of emissions to offset varies according to the card chosen by the client: 2 tonnes for Gold card holders, 1 tonne for the standard card holders. The price for one tonne of carbon is set at 35 Yuan (5 US \$). The corresponding amount is deducted from the cardholder's account. The cardholder has the option of buying additional carbon credits to greater offset their emissions.

Additional mechanisms:

"Happy Low Carbon Life" is a purchasing fund established for emissions reductions. Individuals donate one penny (RMB 0.01) to the fund each time they use the card. These dues are paid when additional carbon credits are bought yearly on 22 April.

Each cardholder is given a "guide to a low-carbon life", a manual on eco-acts. Industrial Bank and Beijing Environment Exchange have jointly set up a search engine called "green records" for the purpose of promoting low-carbon lifestyles and encouraging cardholders to reduce their emissions.

Special offers are made available to individuals according to the sum of purchases made with their card. These offers include gifts like a mug awarded for the first time use of the card, or a bicycle for a monthly purchase amount of 2000 RMB.

Lastly, efforts are made to reduce the environmental impact of the card itself. The card is composed of green and biodegradable materials. Electronic bank statements are sent to clients in order to reduce paper consumption.

2.3. Carbon Capital Fund

Programme carrier: **National Forest Foundation**

Programme name: *Carbon Capital Fund*

Location: US

<http://www.nationalforests.org/carbon>

Type of programme: offset according to cardholders' emissions



What the programme consists of:

The National Forest Foundation is a non-profit organization chartered by the United States Congress in 1991, which works in partnership with the U.S. Forest Service. In 2008, this foundation launched the Carbon Capital Fund to provide a way for those who wish to offset all or part of their personal CO2 emissions by financing carbon sequestration projects.

Emissions accounting method:

The National Forest Foundation developed a carbon calculator which is available on its website. This calculator enables individuals to estimate their personal carbon footprint and compare it to that of an average American. Advice on reducing emissions is also provided.

Carbon Calculator

What state do you live in?	Select a state... <input type="button" value="v"/>
How many people live in your household?	<input type="text" value="1"/> people
How many miles do you drive your car a week?	<input type="text" value="0"/> mi.
What is the average gas mileage for your car?	<input type="text" value="0"/> mpg
Approximately how many hours do you fly per year?	<input type="text" value="0"/> hrs.
What is your average monthly electric bill?	\$ <input type="text" value="0"/> .00
What is your average monthly natural gas bill?	\$ <input type="text" value="0"/> .00
What is your average monthly heating oil bill?	\$ <input type="text" value="0"/> .00
What is your average monthly propane bill?	\$ <input type="text" value="0"/> .00

-- leave blank if unavailable -- round to the nearest dollar --

Financing the offsets:

Anyone who so wishes can decide to offset part or all of their emissions by donating to the national Forest Foundation. To do this, the individuals decide upon the amount they wish to donate to the Carbon Capital Fund, payable by credit card on the National Forest Foundation's website.

Contributions go to carbon sequestration demonstration projects in national forests managed by the National Forest Foundation. These projects are carried forth on land that has been stripped naturally by forest fire. The financial additionality of the projects is highlighted by the fact that they would not have happened without the financial support from the programme.

Each carbon sequestration project adheres to the standards and directives laid out in the documents relative to each national forest. The emission reductions, verified by Winrock International, are calculated on the baseline defined according to the standards equivalent to class A in the Energy Department's directives for declaring emissions.

2.4. Rabocard

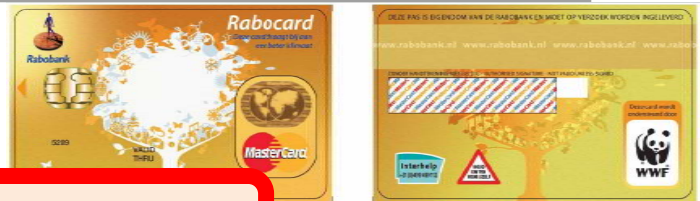
Programme carrier: Rabobank

Programme name: Rabocard

Location: The Netherlands

http://www.rabobank.com

Type of programme: offset according to cardholders' emissions



**PROGRAMME
STOPPED IN 2009**

What the programme consisted of:

From 2007 to 2009, Rabobank offered their Dutch clients to offset for free their total CO₂ emissions associated with purchases made with their credit card. The distinction between purchases was done automatically according to the standards of classification of economic activities (NACE code). The purchases were classified into 50 categories with subcategories. This presentation enabled cardholders to better understand their carbon impact, subdivided into main sectors of spending. The transport sector for example, included categories for automobiles, trains and planes.

The method for calculating the amount of carbon linked to purchases, developed by The Ice Organization, was based on the average monthly household spending for each sector, and the emissions average generated during the lifecycles of the products and services.

Where the carbon credits came from:

A three year partnership between Rabobank and the WWF began with the launch of the Rabocard with its carbon offset application. For the WWF, the partnership entailed putting its logo on the card and for the Rabobank it meant financing only renewable energy development projects with a Gold Standard label backed by the WWF.

1.1 million people owned the card at the end of 2007. However, the programme was cancelled in 2009. This was due partly to the fact that the card contributed very little to the awareness of the clients' CO₂ emissions. This was also due to the fact that the price of the carbon offset credits was more expensive than planned. The bank wasn't able to offset the entire CO₂ emissions linked to purchases made by cardholders (Rabobank Group, 2009).

2.5. **ClimaCount**

Programme carrier: Repay International

Programme name: ClimaCount

Location: The Netherlands during its launch for individuals in 2004, then Europe since September 2008 for company personnel and government workers following a partnership agreement with Visa Europe

<http://www.climacount.com>

Type of programme: offset according to cardholders' emissions



What the programme consists of:

The company RePay International, part of the group Tendris, developed a carbon offset programme linked to a credit card. The ClimaCount programme calculates the CO₂ emissions of purchases made with the credit card, and then offsets them in their totality. It enables cardholders to achieve carbon neutrality without directly paying the carbon offset costs of their emissions (integrated in the cost of the card).

The programme is offered to individuals, companies and governments. A Visa GreenCard for individuals has been offered in the Netherlands since 2004, following a partnership agreement between Repay International, based in the Netherlands, and Visa Europe. A Visa GreenCard Corporate has also been offered since September 2008 to companies and governments following a partnership agreement between Repay International, Visa Europe and PaySquare BV to allow their employees access to this service. Repay International also offers co-branded cards to companies. IKEA is the first company in the Netherlands to give their employees a credit card linked to the ClimaCount programme. The Dutch insurance company Univé also offers this service to its clients.

CO₂ emissions accounting method:

CO₂ emissions are calculated at a set rate. Purchases made with a credit card linked to the ClimaCount system are classified in categories according to the NACE code. The quantity of CO₂ emissions due to purchases is determined by a carbon calculator developed by ClimaCount. This calculator is updated regularly so that the calculation is as accurate, pertinent and complete as possible.

The emission calculation methods used are tested and verified by independent research institutes in each country where the system is offered. In the Netherlands this study was performed by the institute for applied sciences TNO.

Owners of a card linked to the ClimaCount programme receive a monthly statement detailing the entire carbon footprint of their purchases as well as the respective amounts for each sector of spending. This statement informs them of the quantity of CO₂ emissions that will be offset. It also enables them to compare their carbon footprint to both those of other clients of the same bank, and to the regional and world average.



Offset mechanism:

Owners of a card linked to the ClimaCount programme choose their mode of carbon offset. In their personal offset index which is created on the programme's website, they can select one or more of the following programmes: forestry, renewable energies, energy efficiency, greenhouse gas capture. Only the first two were offered in May 2010.

The independent Climate Compensation Fund was established as a part of the ClimaCount programme. This fund invests the profits from ClimaCount into offset programmes selected by the cardholders.

Additional mechanism:

Participants can analyse the carbon impact of their lifestyle and compare it with the national average by using Lifestyler. This tool is a questionnaire on the ClimaCount website with suggestions on reducing personal CO₂ emissions. Information concerning climate change is provided (Carbon Class).

The annual report for ClimaCount's offset programme is audited by PricewaterhouseCoopers.

2.b. Offset according to card use

2.6. Brighter Planet Card

Programme carrier: **Brighter Planet – Bank of America**

Programme name: *Brighter Planet Card*

Location: US

<http://brighterplanet.com>

Type of programme: offset according to card use



What the programme consists of:

Brighter Planet and Bank of America went into partnership to offer a voluntary carbon offset programme. The partnership brings together banking services (accounts and cards) from the Bank of America and compensation mechanisms from Brighter Planet.

Two cards are on offer: a credit card and a debit card. Both cards are co-branded by Brighter Planet and Bank of America. The aim is to offset some of the cardholders' carbon emissions by funding renewable energy projects in the United States. The funding occurs through purchases made by the cardholders.

Carbon offset funding:

Individuals provide financing through the allocation of the financial rewards granted to Bank of America clients when offset credits are bought. The difference between both systems offered is the amount given for offsets.

- The Brighter Planet Visa Credit Card awards the cardholder one point (EarthSmart point) for each dollar spent. Points are collected according to the net retail price of purchases. Points are accumulated monthly and can be converted into dollars which can be used to buy offset credits. One credit is worth 1000 points.

Bonus:

- 50% of additional points were offered by Bank of America up until December 2008.
- 1000 points after the first transaction, to offset the emissions linked to the credit card's fabrication and delivery.
- 1000 points if the client chooses a paperless statement.
- A percentage of the expenditures made with the Visa Check Card, amount not stipulated on the Brighter Planet website, goes to the purchase of offset credits.

Where the carbon offset credits come from:

Brighter Planet chooses a portfolio of diverse renewable energy projects in the USA that are eligible for programme funding. The projects have to meet the criteria of the carbon offset policy defined by Bright Planet's independent advisory board in conjunction with industry experts. The projects have to be real, additional, transparent, and provide extra environmental and social benefits.

The amount of GHG emissions offset in the programme is indicated on their website. At the beginning of May 2010 the amount was 187,859,781 pounds which represents about 85,390 tonnes of CO₂ (the equivalent of 5,666,845 cars on the road in one day).

Additional measures:

Brighter Planet cardholders can calculate their carbon impact. After filling out the questionnaire on the website, the cardholder's personal carbon footprint is sent to them via email. This report includes suggestions on how to reduce individual emissions.

2.7. Cart'étincelle

Programme carrier: **5Continents**

Programme name: *Cart'étincelle (Spark Card)*

Location: France

<http://www.cartetincelle.com>

Type of programme: offset according to card use

Scheme reference: offset projects registered under the Clean Development Mechanism (Kyoto Protocol)

**What the programme consists of:**

The Cart'étincelle (Spark Card) is a personal gift card. The card is mainly for companies and enables them to offer gifts to clients and employees. It can function as part of an internal/external communication policy.

This gift card can be used for three categories of projects: carbon offsetting, reforestation and humanitarian projects. Each category has a specific card.

Carbon offset mechanism:

Each card is credited according to the choice of the person buying the card (number of tonnes of carbon to offset, number of trees to plant, etc.). The amount depends upon the nominal value determined by the buyer as well as its format (standard, personalized, electronic).

The recipient of the Cart'étincelle can then choose the project that they wish to support featured on the programme's website. The carbon offset projects supported by the Cart'étincelle are selected by 5Continents. The projects are registered under the Clean Development Mechanisms (CDM) established by the Kyoto Protocol. They respect ADEME's charter of voluntary carbon offsetting. Reforestation projects fall under the "Plantons pour la planète" (Plant for the Planet) campaign launched by the United Nations Environment Programme (UNEP).

2.8. GreenPay MasterCard

Programme carrier: **Fintura Corporation - Metabank**

Programme name: *GreenPay MasterCard*

Location: US

<http://www.greenpay.com>

Type of programme: offset according to card use



What the programme consists of:

Fintura Corporation, a financial management company, and Metabank formed a partnership in 2007 to launch the GreenPay MasterCard. This credit card enables its owners to offset a set rate of GHG emissions for each dollar spent. The volume offset depends on whether the GHG emissions linked to the purchases on the card are direct or indirect.

- 10 pounds of CO₂e for the purchase of fuel or residential energy (direct emissions)
- 5 pounds of CO₂e for all other purchases (indirect emissions)
- * a metric tonne of CO₂e equals roughly 2200 pounds

An additional bonus of 10,000 pounds of CO₂ is offset for the first time use of the card. This corresponds to one quarter of the average American household emissions for two people according to the EPA (Environmental Protection Agency).

Offset funding method:

The net purchase amount made by the GreenPay MasterCard holders is converted into "Carbon Dollars" in order to determine the sum allocated by the Fintura Corporation for the purchase of carbon credits. This sum is calculated according to the following percentages of the net purchases:

- 1.60% for fuel and household energy purchases
- 0.80% for all other purchases.

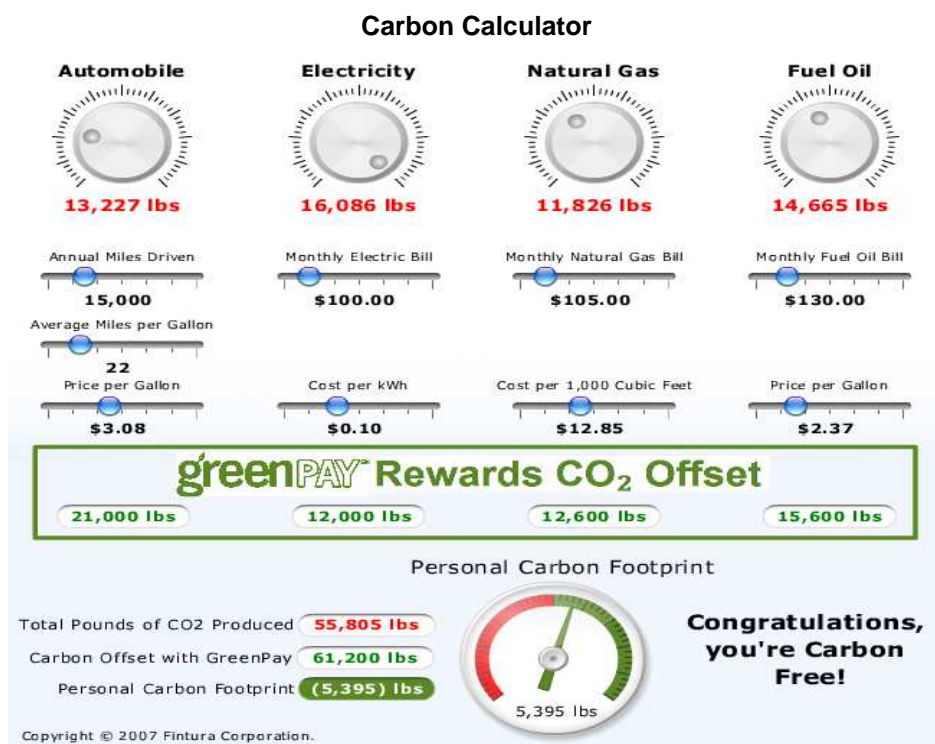
Each purchase is divided into one of the two categories automatically depending on the code the retailer was given by the United States Standard Industrial Classification (SIC).

Where the carbon credits come from:

The carbon credits bought by the Fintura Corporation are issued from emissions reduction projects registered under the Chicago Climate Exchange. The Fintura Corporation is an associate member of this voluntary carbon market created in North America in 2003.

What the cardholders do:

Cardholders can calculate their personal carbon impact with the calculator developed by Fintura Corporation. This calculator enables individuals to know the quantity of CO₂e they can offset through their purchases.



2.9. Eco Mastercard

Programme carrier: **GE Money**

Programme name: *Eco Mastercard*

Location: Australia

http://www.gemoney.com.au/en/credit_cards/eco_mastercard/

Type of programme: offset according to card use



What the programme consists of:

GE Money, the financial branch of General Electric, launched the Eco Mastercard in 2008. Cardholders can offset their GHG emissions by investing all or a part of the financial rewards from their bank account (sum equivalent to 1% of their monthly spending). They can decide to give this sum at the moment of purchase or give only half, and receive the other half.

Carbon offset scheme:

The funds dedicated to the purchase and cancellation of offset credits are collected annually by GE Money on April 22. GE Money invests them in different GHG emission reduction projects: reforestation, renewable energy, energy efficiency, water treatment, conservation of habitats, and other environmental initiatives. The selected projects adhere to the standards developed by Greenhouse Gas Services, a joint venture between GE Energy Financial Services and energy producer AES Corporation. The projects are assessed by Green Order, a strategy and management consultancy firm.

The Eco MasterCard fee is 49 AUD plus usage fees.

GE Money had initially offered a similar scheme in the US in 2008.
The Earth Rewards Mastercard was discontinued in 2009.

2.10. ReDirect Guide Visa

Programme carrier: **ReDirect Guide - ShoreBank Pacific**

Programme name: *ReDirect Guide Visa*

Location: US

<http://www.redirectguide.com>

Type of programme: offsets according to card use

Scheme reference: projects registered under the Kyoto Protocol Clean Development Mechanism (CDM) (but not only)



What the programme consists of:

The ReDirect Guide Visa was brought forth from the partnership between ReDirect and Shore Bank Pacific. Cardholders can offset their emissions by financing GHG emissions reduction projects. 30 USD is given for offsetting for each account opened, plus a sum for each payment made by card (equalling 30% of the interchange rate, representing 1.4% of the sum).

Carbon offset scheme:

ReDirect Guide acts as an intermediary by collecting and allocating the funds raised in the programme. Half of the funds are used by ShoreBank Pacific to finance the programme and other sustainable development programmes. The other half, Sustainable Travel International invests in offset credits.

Credits are bought either from ClimateCare or The Bonneville Environmental Foundation. In the first case, the credits are issued from international GHG emissions reduction projects that meet the provisions of Kyoto Protocol Clean Development Mechanism provisions, and have the Gold Standard label. In the second case, the credits are issued from domestic renewable energy projects certified by Green-e Climate.

By May 2010, 255 metric tonnes of CO₂ had been offset since the programme's launch in 2008. This is equivalent to the annual electricity consumption for 35.4 households in the US.

Additional Mechanism:

ReDirect Guide Visa cardholders can if they so wish calculate their carbon footprint with the Sustainable Travel International's website calculator.

2.11. Carte de crédit Visa Triodos (Visa Triodos Credit Card)

Programme carrier: **Triodos Bank** (Spanish branch)

Programme name: *Carte de crédit Visa Triodos* (Visa Triodos Credit Card)

Location: Spain

http://www.triodos.es/es/personal_banking/accounts/233428/

Type of programme: offset according to card use

Scheme reference: FSC certification

**What the programme consists of:**

Since 2006, the Spanish branch of Triodos Bank has offered to offset the emissions of Triodos Visa cardholders. One tonne of CO₂e is offset each year by the bank free of charge if the card is used on an average of five times a month for a year.

Where the carbon credits come from:

The credits are issued from sustainable forest plantations certified by the Forest Stewardship Council. The FSC is an international organization that promotes responsible and sustainable forest management. They are bought through the intermediary of the Dutch ClimateNeutral Group. Triodos is a shareholder in this company.

Additional mechanism:

For the first purchase made with the card, a tree is planted in the client's name in the forest of Triodos, province of Albacete, Spain.

Annex 3: Support for sustainable consumption and behaviour

Loyalty cards that allow consumers to accumulate redeemable points are offered by banks, retailers and local authorities. Partnerships are often formed with private companies to promote these programmes

One category of programmes offered by non-profit organizations, retailers and local authorities gears to orient behaviour towards sustainability. Points are awarded when certain goods are purchased or certain actions are adopted. Points can be redeemed for gifts or discount prices. The ecological dimension is not always a criterion for the allotment or use of points. It is possible for it to be only taken into consideration in one case or the other.

A second category of programmes rewards points for card use, or purchases made with the card. Points can then be traded in for ecological products.

3.a. Support for sustainability according to purchases and behaviour

3.1. De e-portemonnee (e-wallet)

Programme carrier: **Bond Beter Leefmilieu – Limburg.net**

Programme name: *De e-portemonnee (e-wallet)*

Location: Belgium, Flanders region, Limburg province

<http://www.bondbeterleefmilieu.be/>

Type of programme: support according to purchases and behaviour



Bond Beter Leefmilieu (BBLV) is a group of about 150 ecological organizations of varying sizes. This NGO initiated the project e-portemonnee. This project is a joint venture developed in 2000 by BBLV and Limburg.net (a group of inter-communal waste treatment services).

An experiment was proposed to the town of Overpelt in 2004. Financing was granted to BBLV to coordinate a one year pilot project from November 2005 to October 2006. This programme is still functioning in Overpelt and has spread to six other towns in the Limburg province since 2007.

What the programme consists of:

De e-portemonnee is a loyalty programme for sustainability. It incites citizens to adopt sustainable behaviour by awarding points that can be redeemed for discounts or gifts. The value of these points is about 1 euro cent.

The scheme proposed by BBLV is an action plan based on local governance. There are two lists: one dedicated to collecting points, and one for spending points. These lists state the actions to be performed to receive points as well as the goods and services that can be obtained in exchange for points. No specific methodology was used to compile the lists. The

contents of the lists (actions and the number of points awarded for each) are decided upon by the participating municipalities in junction with BBLV who ensures that the actions do contribute to sustainable development. These lists conform to the targets and specific issues recognized by the local authorities.

Scope:

As the programme was developed jointly with Limburg.net, points are rewarded specifically for acts contributing to sustainable waste management. Energy (low consumption light bulbs, electricity generation from renewable energy, etc.) and its relation to transport and social services (childcare, visiting the elderly in retirement homes or hospitals) can also be taken into consideration.

Point circulation:

The local authorities in charge of the project issue most of the points. Few businesses take part in the project due to the small size of the participating communities. Stores specializing in organic or fair trade products fulfil the role of sponsors. They distribute paper coupons representing specific numbers of points. These points are registered by local authorities onto a cardholder's account, and can be used for discounts in stores. Points are mainly redeemed for cultural events and social services provided by communities (swimming pools, bus tickets, festivals, football matches, etc.).

Technical mechanism:

Limburg.net issued the card that was used during the pilot phase in Overpelt. This card was distributed to all the families in the municipality and allowed access to certain services (waste disposal facility, parks, etc.). The e-portemonnee computer programme was developed with specific software by Limburg.net. and integrated into an existing IT (card and network) system which made operations easier and cheaper.

The project was renewed in 2007 and extended to other towns. Two cards can now be used indistinctly: the card issued by Limburg.net and the electronic national identity card. However, both cards cannot be credited for the same action. The conversion from community cards to national identity cards was easy due to the fact that few IT modifications were necessary.

The e-portemonnee system is entirely electronic. The card is used for identification purposes only. It contains neither the personal data of residents nor the amount of points they have. Identification is performed automatically (with a card reader) or manually (typing the card number into the system) depending on the kind of equipment the members on the "collect" and "spend" lists have. Cardholders can log onto the e-portemonnee website to see how many points they have. They can also gain points electronically by entering data such as the amounts of their energy bills. A false declaration (the quantity of compost for example) can lead to exclusion from the programme.

Results:

In the final report, the pilot phase was judged to be satisfactory in terms of participation. 10% of the families living in Overpelt participated in the programme during the first year. 358,024 points were collected and 123,280 points were spent. The project now extends to seven towns in the province of Limburg. 150,000 inhabitants, who represent around 60,000 families, are concerned. Four or five percent of the families participate. This appears to be due to a lack of advertising by the municipality. The geographical extension of the programme is being considered. This would encourage local business participation. The next step would be to open the programme up to include the entire province of Limburg and then the region of Flanders. The programme extension within Limburg depends in part on the choice of its future IT system, which should be decided upon before 2012. De e-portemonnee is adapted to Limburg.net's system, to which BBLV is linked.

3.2. Meilleur pour ma planète (Better for My Planet)

Programme carrier: **Bricomarché**
 Programme name: *Meilleur pour ma planète (Better for my Planet)*
 Location: France
<http://www.bricomarche.com/developpement-durable.html>
 Type of programme: support according to purchases and behaviour
 Scheme reference: eco-labels (not the only support criteria)



What the programme consists of:

The programme “Meilleur pour ma planète” (Better for My Planet) is the ecological section of the chain Bricomarché’s loyalty programme. Owners of the store’s loyalty card regularly receive, in addition to regular offers on certain products, financial perks (“meilleurs pour mon budget”- better for my budget) on selected products that respect the environment (“meilleur pour ma planète”) during promotions. The financial advantage of these “green” perks is similar to “best value” products (5% of purchased sums are credited on the loyalty card).



Scope:

“Green” perks are offered first for products with eco-labels (EU Eco-label, NF Environnement brand, “recyclable” label, PEFC, FSC), which guarantee that they respect the environment. They are also offered on other products that put forward their contribution to natural resource savings (in particular energy and water). These products are indicated with the label “Meilleur pour ma planète.” The “green” perk amount is indicated in the Bricomarché catalogues next to each product.

The euros collected by buying “meilleurs pour la planète” products are recorded on the loyalty account. They can be used for any purchase at Bricomarché, including products without the “meilleur pour ma planète” label.

Additional mechanism:

Bricomarché’s commitment to sustainable development includes reducing packaging. Loose items and goods with little or no packaging are available.

3.3. Coop MedMera card

Programme carrier: **Coop**
 Programme name: *Coop MedMera card*
 Location: Sweden
<http://www.coop.se>
 Type of programme: support according to purchases and behaviour
 Scheme reference: labels

KF, the Swedish Co-operative Union, is a federation of consumer co-operatives in Sweden. KF regroups 47 co-operatives which are open to individual membership.

Coop, one of the principal retailers in the country, is a member of the KF group. A loyalty card is given to each of its individual members (more than 3.5 million). The Coop MedMera card is proof of their membership in the co-operative and their participation in the reward programme that is set up for them. The card allows members to collect loyalty points in more than 1000 retail stores in Sweden.

Coop has actively promoted the sale of local, free trade, and organic products for a long time. Points can be collected and redeemed when these products are bought. These points are doubled during annual campaigns which encourage the purchase of these products.

3.4. consoGlobe

Programme carrier: **consoGlobe**

Programme name: *consoGlobe*

Location: France, Belgium

<http://www.consoGlobe.com>

Type of programme: support according to purchases and behaviour



What the programme consists of:

ConsoGlobe is an Internet portal created in 2005 dedicated to sustainable development and new responsible consumption in all its forms (ecological shopping guides, information and advice on responsible consumption, ecological services such as trading, second hand goods, renting, etc.).

An online shop offers ecological products to programme members (1.3 million). An online account is opened in the name of each member. This account tracks purchases as well as the loyalty points accumulated. A point is given for each euro spent. They are accumulated on an electronic loyalty card and can be converted into gift certificates (10 euros for 250 points). These gift certificates are personal, non transferable, nor can they be converted into cash. They are redeemable for subsequent purchases from the consoGlobe online store. They are valid for a maximum period of six months.

Additional mechanism:

The consoGlobe programme enables members to give donations to the humanitarian organization "Achat du Coeur" (Purchases from the Heart). Their website is integrated into the consoGlobe portal in order to receive financial support from clients who wish to donate. Donations are given online with Illicado, a multi-retailer, multi-channel gift card. The amount is set by consoGlobe members. Donations can also be given through the intermediary of consoRécup, a website dedicated to trading goods and services between individuals, a service offered by consoGlobe.

3.5. LA CARTE

Programme carrier: **E. Leclerc**

Programme name: **LA CARTE**

Location: France

http://www.e-leclerc.com/c2k/portail/conso/plus_promos/carte_leclerc/plus_promos_carte.asp

Type of programme: support according to purchases and behaviour

Scheme reference: labels



What the programme consists of:

The retailer's loyalty programme offers, in addition to discount coupons, E. Leclerc Tickets on certain products each week in their catalogue. Sometimes these products are sustainable, guaranteed by official labels or not. E. Leclerc Tickets can also be obtained for the purchase of a minimum of five house brand products (Marque Repère). Their total purchase sum is credited onto the loyalty card. They can be spent on any type of purchase, excluding books and fuel.

Additional mechanism:

Access to the Club Consommation Responsable (Responsible Consumption Club) is reserved to loyalty cardholders. Club members receive coupons for organic and sustainable products. These purchases are either guaranteed by reliable labels or meet specific, objective and verifiable criteria (product or packaging containing a certain percentage of recycled material for example). The criteria for awarding discount coupons are defined by a charter.

3.6. GreenCommerce

Programme carrier: **GreenCommerce SAS**

Programme name: *GreenCommerce*

Location: France

<http://www.greencommerce.fr>

Type of programme: support according to purchases and behaviour

What the programme consists of:

GreenCommerce is an Internet site for businesses and individuals to buy and sell different categories of environmentally-friendly products. The programme is based on the use of Oxygène points (O2). These points are necessary to post a classified ad. They are collected through purchases made on the website or by donating to non-profit organizations via the website.

A number of Oxygène points are attributed to each ad. The seller sets the amount. Ads with the most points are given priority in search results. Sellers are hence incited to collect points by giving donations or buying products on the site.

List of organizations supported by the programme:

WWF, Surfrider Foundation, CO2 Solidaire, France Nature Environnement.

3.7. Community Card

Programme carrier: **Interra**

Programme name: *Community Card*

Location: US

<http://www.interraproject.org>

Type of programme: support according to purchases and behaviour



What the programme consists of:

This community card programme is a project of Interra, a non-profit organization based in Seattle, WA. Eminent figures such as Dee Hock, founder of Visa International, and Greg Steltenpohl, founder of the Odwalla Juice company bought by Coca-Cola, were the initiators of this project, launched at the end of 2006.

The Community Card programme works on the same principles as loyalty cards. It aims to incite consumers to change their purchasing behaviour by turning to small local businesses which are supplied by local producers in order to reinforce the economies of local communities. Businesses that wish to participate in the programme must adhere to certain principals such as respecting the environment and social justice. A percentage of the purchased sums bought from local businesses goes to discounts for consumers, donations to non-profit organizations or schools chosen by the consumers.

Individuals registering in the programme receive a community card. This loyalty card comes in the form of a payment card: a bank card that the individual already owns and is recorded in the system. Because this type of card is universal, the card is accepted in the participating store's point of sale card reader at checkout. The client's earnings are electronically calculated and credited to their online account; up to four names can be on one account.

Interra has formed an alliance of producers and local retailers that is linked in a network with consumers on a web portal. It assesses the respect of sustainability and social justice values by the members of the alliance

The positive incentive mechanism is financed by participating companies at a rate of 5% of the sum purchased with the community card. The sums collected are divided in the following manner: 2% for donations, 2% for consumers, and 1% for Interra for operating costs.

Consumers receive either Interra loyalty points or conventional money depending on the communities participating. The gains accumulated on their accounts can be redeemed for a check or bank transfer. They can also be traded in as donations in order to increase the amount allocated in this way.

Scope:

The community card programme was initially developed in Seattle and Boston before being extended to other cities on the East and West Coasts of the US.

All purchases of 20 USD or more are eligible in the scheme.

3.8. LACARTE

Programme carrier: **Monoprix**
Programme name: **LACARTE**
Location: France (10 days per year)
<http://www.monoprix.fr/carte-fidelite/la-carte-de-fidelite.html>
Type of programme: support according to purchases and behaviour
Scheme reference: labels

**What the programme consists of:**

The retailer Monoprix's loyalty programme, which is a part of the S'Miles network, offers points which are redeemable for gifts and discount coupons. Since 2003 Monoprix has run promotions that highlight its policy on sustainable development and more specifically sustainable products (organic and/or fair trade, green products, seafood products coming from responsible fishing).

This promotion occurs during the French Sustainable Development Week. They are not presently planning on extending this promotion over a longer period of time.

Bonus loyalty points for the purchase of sustainable products:

During Sustainable Development Week 2009, cardholders were eligible for 5% discounts on Monoprix Bio (organic) and Monoprix Green food products, and 10% discounts on Hygiène Beauté Monoprix Bio (organic hygiene and beauty products) and organic fair trade cotton textiles.

During the 2010 Sustainable Development Week, the number of points accumulated for the purchase of Monoprix's house brand of sustainable development products (organic and/or fair trade, green products, seafood products coming from responsible fishing) were quintupled.

Incentives for purchasing sustainable products within the framework of a donations programme:

During the Sustainable Development Weeks 2008 and 2010, 1% of the sales made by Monoprix of sustainable products was given to the Fondation bioRe which supports organic fair trade cotton growers in India and Tanzania. This operation included products with eco-labels (European and NF Environment), Max Havelaar, as well as the labels AB, FSC/PEFC, organic and ecological cosmetics, MSC and bioRe. One euro per "créateur" (designer) tee-shirt made of organic fair trade cotton from the label bioRe was donated to the Fondation bioRe in 2009 and 2010.

Additional mechanism:

Monoprix recently modified its loyalty programme. S'Miles points are sent out each month to customers in the form of coupons depending on the amount of purchases made. Customers who have already adopted responsible consumption practices are encouraged to continue.

3.9. Green Clubcard

Programme carrier: **Tesco**

Programme name: *Green Clubcard*

Location: UK

<http://www.tesco.com/clubcard/clubcard>

Type of programme: support according to purchases and behaviour

Scheme reference: labels (not the only criteria for support)



Clubcard is a standard loyalty programme offered by Tesco. This programme offers points for purchases made in stores, online and at partner retailers. A loyalty point is awarded for each pound sterling spent. The number of points can be doubled during promotions on certain items. Earned points are deposited into the loyalty account and figure on the receipts after each purchase. Statements are sent every trimester by email. The points are converted into one pound vouchers, redeemable once 1000 points are accumulated. Vouchers can be used for any purchase in a Tesco store.

An environmental dimension was added to the programme in 2006 with the launch of the Green Clubcard.

What the programme consists of:

The ecological aspect of the loyalty programme consists of awarding green points. A distinction is made between these points and standard points so that consumers are aware that they are receiving them for purchases which follow the criteria of sustainable development. Green points figure on receipts and statements in a distinct column next to standard points. They have the

same value and can be cashed in similarly. Vouchers obtained with green points are not necessarily spent on ecological products.

Scope:

The Green Clubcard programme initially only covered the reuse of plastic bags (one green point was awarded for each bag reused). It was extended progressively and now covers delivery without bags for online purchases (1 point), the purchase of insulation materials or products that use renewable energy to make homes more energy efficient (1 point per pound sterling spent), and bringing certain used products to Tesco recycling collection centres (aluminium cans, ink cartridges, cell phones). This programme can periodically include the purchase of certain goods that correspond to sustainable development principles such as organically farmed or fair trade products. Promotional offers (double green points) are also offered on certain purchases.

Extension of the programme on the basis of research on product carbon footprints:

Tesco has committed to reduce the CO₂ emissions generated in the supply chain of the products they offer (-30% by 2020) and help customers reduce their carbon footprint by 50% by 2020 (Tesco 2010). The retail chain is working on product footprints with Carbon Trust and the Sustainable Consumption Institute of the University of Manchester. The target to have environmental information on 500 products by the beginning of 2010 has already been surpassed. These initiatives could be the means to further development of the ecological aspect of the loyalty programme by awarding green points for the purchase of products with low carbon footprints.

3.10. Eco Rewards

Programme carrier: **UMB**
Programme name: *Eco Rewards*
Location: US
<https://www.umb.com/Personal/CreditCards/index.html>
Type of programme: support according to purchases and behaviour



The Eco Rewards Visa Platinum credit card offered by UMB gives cardholders points for purchases of environmentally sound products and services. An Eco Rewards website exists for that purpose. Cardholders can consult their purchases (category and amount) on the website and take advantage of the double points.

Various options are offered by different American banks for redeeming points: cash, travel, gifts, etc.

3.11. SUCCESS

Programme carrier: **City of Belfast**
Programme name: *SUCCESS*
Location: pilot zones in 4 European cities and regions
http://www.nweurope.eu/index.php?act=project_detail&id=3993
Type of programme: support according to purchases and behaviour
Scheme reference: eco-labels (not the only criteria for support)

What the programme consists of:

The objective of the SUCCESS programme (Sustainable Carbon Card for Community Enabling Schemes), formerly the City Carbon Card, is to incite individual behavioural changes in order to reduce CO2 emissions and increase territory sustainability. Incentives for behavioural changes are based on awarding points for the purchase of products and services with low ecological impacts.

The programme joins four partners in the north west of Europe: Belfast, Dublin Regional Authority, Brussels, Institut Bruxellois for environmental management, Liverpool. The towns of Anvers, Frankfurt, and Luxembourg, Lancashire County (UK), Isle of Texel (NL), and the Eurocities network are observers.

The SUCCESS programme was approved in March 2010 within the framework of the European INTERREG 4B instrument, and benefits from financial support for a period of four years (until March 2014). The programme is expected to eventually become financially and politically autonomous.

The programme is planned to be developed in six steps: identification of the systems application within the participating regions; assessment of potential national and regional carbon savings that could result from the project; definition of concepts, technologies and certifications of the carbon card based on previous similar experiences; identification of participating sectors and communities in each region; launch of a pilot system; marketing and communication; assessment and diffusion of the model in view of future progress post Interreg financing. International research groups composed of representatives from participating towns and cities have been formed for this purpose.

The SUCCESS programme is a framework for applying common methods to specific objectives. Each participating city and region uses the same standards, norms, criteria and technology to attain their own specific and locally defined sustainable development objectives.

The SUCCESS programme is an extension of the NU-card, a sustainable incentive card offered in Rotterdam during a pilot project lasting 18 months in 2002 and 2003. This pilot project was launched by the municipality of Rotterdam, Rabobank and the consultancy firm Stichting Points. It was the beneficiary of the European financial aid program LIFE. The NU-card is a loyalty card for sustainable development. Points are awarded for adopting sustainable behaviour and purchasing green consumption products. Points can be redeemed for gifts or discounts on environmentally-friendly products and services.



<http://www.nuspaarpas.nl>

Modelling itself after this initiative, the National Consumer Council and the Welsh Consumer Council organized two seminars at the end of 2003 to discuss the opportunity to establish a mechanism similar to the NU-card in England and Wales. The introduction of a sustainable incentive card in London was also proposed in 2007 by Mike Tuffrey of the Liberal Democrat Party.

In 2006 the municipality of Belfast conducted a study on the feasibility of introducing a similar mechanism able to function autonomously after an initial pilot phase. A campaign to find partners was launched in 2008 within the Eurocities network.

Scope:

Each partner city and region defines the programme scope in the pilot zones in their jurisdiction under the following three domains: stimulation of green consumption; reduction of CO₂ emissions; reduction, waste reuse and recycling; promotion of sound ecological urban transportation, social economies, cultural and artistic sectors, athletics and healthy diets; strengthening of regional economies.

A minimum of 50,000 individuals and about 200 businesses are expected to participate in each pilot zone.

Nature of the points, how they are awarded and spent:

The nature of the points as well as the terms for their allocation and spending are to be defined at the start of the programme. The ecological dimension is a criterion for the allocation and expenditure of points for purchases or services. Classification of the products and services by their carbon potential is planned.

- Products and services eligible for issuance: goods with eco-labels, energy efficient appliances and lights, renewable energies, bicycles, etc.; improvements in household energy efficiency; recycling (waste); taking unwanted goods to second hand shops; using other means of transport than cars for home-work commutes (public transport, taxis, car pools); buying goods from local stores or that are locally produced; volunteering (assistance to the elderly, tutoring, etc.)
- Products and services eligible for spending: ecologically sound goods (eco-labels, energy efficient appliances and lights, renewable energies, etc.); cultural and artistic events, music lessons, sports and training courses; donations to local charities

Cards given to programme participants can be used in each of the pilot zones. This encourages points trading between partner cities.

Additional mechanisms:

The programme is meant to retain CO₂ as the criterion for assessing its environmental effectiveness. The potential emissions savings in the pilot zones should be identified ex-ante to calculate the reductions achieved throughout the duration of the programme.

3.12. Umwelt Plus Karte

Programme carrier: **City of Heidelberg**
 Programme name: *Umwelt Plus Karte*
 Location: region of Heidelberg (Germany)
<http://www.umweltdirekt.de/umweltpluskarte/karte/>
 Type of programme: support according to purchases and behaviour



This programme was developed in 2003 by the city of Heidelberg as a part of its Local Agenda 21 in cooperation with the Institute for Ecological Economy Research (IÖW) in Berlin. Its development and implementation were financed by the Federal Ministry of Education and Research.

What the programme consists of:

The objective is to promote sustainable products and services as well as local producers and suppliers. Conciliation is brought about between high environmental performance, conformity to certain social expectations, and viable economic concerns.

Cardholders receive financial perks from participating retailers for buying certain products, services, and tickets to certain cultural events. These financial advantages include discounts up to 10% of the initial price, and other preferential conditions (special offers and promotions). The yearly fee for the card is 15 euros. One additional person per household can have a card for a fee of 3 euros.

Scope:

The scope of the programme is large. It covers the food sector, culture and leisure activities, construction, interior design, furniture, garden supplies, clothing, transport, and health. A number of stores are partners. They are identified by the umwelt.plus.karte symbol and appear on the programme's website and in the regional magazine Umwelt Direkt.

3.13. Live Green Membership Card

Programme carrier: City of Toronto

Programme name: Live Green membership card

Location: Toronto (Canada)

http://www.toronto.ca/livegreen/getinvolved_livegreen_membership_card.htm

Type of programme: support according to purchases and behaviour



What the programme consists of:

The Live Green Toronto membership card programme was launched in August 2010. A precedent version started in 1996 when a programme called Waste Watchers was created to help the city of Toronto reach its objectives for waste management. This programme was renamed Toronto Environment Volunteers after having been progressively expanded to cover other environmental aspects. Backed by the Toronto Environmental Office since 2009, it was re-launched as Live Green Toronto Volunteers in 2010. The objective is to help the city comply with its climate change commitment, inform Toronto residents of the different ecological initiatives taken by the city and help them adopt more environmentally respectful lifestyles. The Live Green Toronto membership card is an element of the Live Green Toronto Volunteers programme. It aims to incite individuals who live and work in Toronto, as well as businesses in the city, to move towards sustainability.

Scope:

The Live Green Toronto Volunteers programme deals with different environmental aspects: climate change, waste management, energy and water conservation, reduction of pesticides, sustainable transportation and urban agriculture. It addresses people as well as businesses. It aims to enable them to make intelligent ecological choices by providing suggestions on reducing their environmental impact, information on possible reductions, available subsidies, and relevant organizations to contact.

The Live Green Toronto membership card programme aims to promote trade with businesses that are committed to reducing their environmental impact and offering products and services that respect the environment. The card is issued free of charge to any person 14 years of age or older who lives or works in Toronto. The card embodies participation in the programme; it is not a payment card. Cardholders receive special offers and discounts from retailers and a quarterly

newsletter. Business participation in the programme is free of charge but they finance the advantages they offer to cardholders.

3.b. Support for sustainability according to card use

3.14. Green Rewards

Programme carrier: **Green Rewards**
Programme name: *Green Rewards*
Location: UK
<http://greenrewards.co.uk>
Type of programme: support according to card use

What the programme consists of:

The company Green Rewards, founded in 2006, launched a loyalty programme at the beginning of 2008. Green points are received for online purchases with retailers listed on the Green Rewards website. Ecological products and services can be obtained with the points. 900 partners were involved at the programme's launch, including Tesco, Marks & Spencer, Boots, the Body Shop and B&Q.

How points are obtained and spent:

Green points are awarded according to purchase sums (one Green point per pound sterling spent). Depending on the offers given by Green Rewards partner suppliers, standard goods and ecological goods purchases are eligible for points,

Green points are recorded onto an electronic loyalty card given when registering for the programme. The points are redeemed during purchases of ecological goods. About 450 products and services are offered on the site, such as solar chargers for iPods and clothes that respect the environment. Carbon offset credits are also offered via a partnership with Carbon Impacts. The prices for different products and services are indicated in pounds sterling and Green points. This makes it possible to pay the difference in conventional money if there is not a sufficient amount of Green points.

Participants can also obtain Green points by posting reviews of ecological products and services that they have procured from Green Rewards, or eco-tips for adopting more sustainable lifestyles. 12 tips on reducing individual carbon footprints are presented on the site.

3.15. Wells Fargo Rewards

Programme carrier: **Wells Fargo**
Programme name: *Wells Fargo Rewards*
Location: US
<https://enhancedrewards.wellsfargorewards.com/ip-wf/viewHomePage.do>
Type of programme: support according to card use

Wells Fargo bank clients earn points for everyday purchases. These points can be redeemed for donations to charity organizations or sound ecological gifts (such as electric products that use renewable energies, gift certificates for electricity produced by windmills, etc.).

Annex 4 : Donations to environmental and charity organizations

Charity cards are offered by several banks and retail chains. The objective is not to contribute to cardholders' awareness of their environmental impact. The aim is to give financial support to ecological and charity organizations or actions that protect the environment.

The partnership benefits the banks and businesses who can publicize their contributions and the charities who receive the funds. Banks sometimes issue co-branded bank cards on which the logos of both partners appear.

Donations are made by either the programme sponsors or cardholders. The amount depends on card use, or the amount spent with the card.

4.1. WorldPoints Rewards

Programme carrier: **Bank of America**
 Programme name: *WorldPoints Rewards*
 Location: US
https://www.bankofamerica.com/myexpression_banking/segment.do?body=segment&segmentid=CHAR
 Type of programme: donations



Bank of America offers different cards that allow accumulate points when purchases are made (1 point per dollar spent on the card). Cardholders can trade their points in for cash, trips, hotel stays, car rentals, etc.) A charity element was added to the Rewards programme. Clients can donate their points to charities.

Among the 21 organizations that benefit from the programme, four are dedicated to the protection of the environment: Defenders of Wildlife, National Wildlife Federation, The Nature Conservancy, WWF.

A similar programme is offered in the US by Union Bank
<https://www.unionbank.com/personal/products/credit/cards/index.jsp>

4.2. Barclaycard Breathe Credit Card

Programme carrier: **Barclays**
 Programme name: *Barclaycard Breathe Credit Card*
 Location: UK
<http://www.barclaycard.co.uk/personal-home/cards/breathe/>
 Type of programme: donations



What the programme consists of:

This programme, launched in 2007, funds projects that tackle climate change. The amount of the donations, paid for by Barclaycard, is 0.5% of the money spent with the Breathe Credit Card. The donation is made to Pure, the Clean Planet Trust.

Donations go to financing GHG emissions reduction projects. Six projects linked to renewable energies are current beneficiaries of this financial support: one in the UK (installation of solar panels in schools), the others are in developing countries (India, Brazil, and China). The latter are registered as CDMs of the Kyoto Protocol.

Additional mechanisms:

Cardholders receive discounts on certain ecologically sound products: 10% on bicycles bought at Halfords, 15% on plants and garden products bought at Crocus, and 5.9% on public transport services, with the exception of London.

4.3. Charity Credit Card

Programme carrier: **Co-operative Bank**

Programme name: *Charity Credit Card*

Location: UK

http://www.co-operativebank.co.uk/servlet/Satellite/
1193206374589,CFSweb/Page/Bank-CreditCards

Type of programme: donations



The Co-operative Bank offers various co-branded cards that demonstrate the partnership with different charity organizations: Action Aid, Amnesty International, Christian Aid, Friends of the Earth, Greenpeace, Help the Aged, Oxfam, RSPB, Save the Children, Shelter, Water Aid, Woodland Trust.

The donation amount is relatively similar for each card: 15 pounds sterling for each account opened, 2.5 additional pounds if the card is used during the first six months of the account being opened, and 25 pence for each 100 pounds spent with the card or transferred onto the account. The Royal Society for the Protection of Birds receives more for each opened account (18 pounds).

4.4 Carte Agir (Act Card)

Programme carrier: **Crédit coopératif**

Programme name: *Carte Agir (Act Card)*

Location: France

http://www.carte-agir.coop

Type of programme: donations



The Carte Agir funds environmental and charity organizations through donations given for each card registration (3 euros) and for each withdrawal made from an ATM (0.06 euros per withdrawal; 0.12 euros for an ATM from the Banques Populaires network). The card is offered

for the same price as a similar classic bank card. Donations are paid for by Cr dit Coop ratif. 77,000 euros were paid out in 2009.

An additional option, Solidaires Ensemble (Solidarity Together), was added to the programme in the beginning of 2010. Carte Agir cardholders can add their own donations to those made by Cr dit Coop ratif. Clients choose the amount donated per transaction (with a minimum of 5 cents) and the beneficiary among the partner organizations. They can access donation options on their online personal page (amount per transaction, choice of beneficiary, possibility of suspending donations, spending alerts, donation simulator) and watch the development of their donations as well as those of the cardholder community and Cr dit Coop ratif. The donation amount is deducted each month from the individual's account.

List of partner organizations:

Action contre la Faim, Aides, Aide et Action, Fondations  nergies pour le Monde, France Nature Environnement, M decins du Monde, SOS Villages d'enfants, Surfrider Foundation Europe, Unapei, Terre et Humanisme.

4.5. Carte Bleue Visa

Programme carrier: HSBC

Programme name: Carte Bleue Visa

Location: France

<https://www.hsbc.fr/1/2/hsbc-france/particuliers/cartes/carte-bleue-visa>

Type of programme: donations

Since 2008, for every registration for a new Carte Bleue Visa, HSBC gives 1 euro to the GoodPlanet organization. This donation contributes to the financial support for the pilot education and sustainable development project aimed at the children of Port-Cros Island, in partnership with the teaching league FOL of Var. Clients are offered a choice of 4 different GoodPlanet motifs for their card.

In 2008 the HSBC bank also launched the Green Credit Card. This card funds a programme to equip school roofs with solar panels. A sum equivalent to 0.1% of the amount spent with the Green Credit Card is paid to the programme. This was initiated by The Hong Kong Bank Foundation in a joint effort with the University of Hong Kong. Cardholders can also benefit from offers on ecologically sound products and services (gifts or discounts).

<http://www.hsbc.com.hk/1/2/hk/cards/green>

4.6. Cartes Caritatives (Charity Cards)

Programme carrier: La Banque Postale

Programme name: Cartes Caritatives (Charity Cards)

Location: France

<https://www.labanquepostale.fr/index/particuliers/>

[au_quotidien/moyens_de_paiements/](https://www.labanquepostale.fr/index/particuliers/)

[programme_cartes_caritatives.bref.html](https://www.labanquepostale.fr/index/particuliers/)

Type of programme: donations



The Banque Postale offers three charity cards that donate to Unicef and Solidarit  Sida (Aids Solidarity). This financial support consists of an annual gift of 2 euros paid by the cardholder, over a period of time that they define.

4.7. Avantage

Programme carrier: **LCL**

Programme name: *Avantage*

Location: France

http://particuliers.lcl.fr/quotidien/services-bancaires/services_complementaires/programme-fidelite-avantage/?rubrique=EnBref

Type of programme: donations

The loyalty programme Avantage is reserved to cardholders and allows them to accumulate points for using their card for payments or withdrawals from LCL ATMs (10 points for 100 euros). Points are collected more quickly with seniority and status. The balance of points collected is indicated on the monthly statement.

A partnership with LCL and several organizations was formed to allow clients to benefit from different types of rewards for points. A charity dimension was added to the loyalty programme with the possibility of making donations to the CFPE (French Centre for Child Protection).

4.8. Cartes Collection caritative (Charity Collection Card)

Programme carrier: **Société Générale**

Programme name: *Cartes Collection caritative (Charity Collection Card)*

Location: France

https://particuliers.societegenerale.fr/essentiel_quotidien/cartes/cartes_collection.html

Type of programme: donations



The charity Collection cards were launched in 2008. This initiative followed a project presented by students for the Citizen Act, an annual international competition initiated by Société Générale in order to collect ideas on “the bank of tomorrow”.

What the programme consists of:

The charity cards are offered in the Société Générale Collection card range, which includes 100 models. The charity Collection has co-branded cards that fund organizations or foundations that are in partnership with the bank. Clients choose among 14 partners (11 partners for the charity Collection, and three partners for two other Collections that share the same principle: animals and people).

For each payment made with this type of card, Société Générale donates 0.05 euros to the organization or foundation of the cardholder's choice. The Collection cards cost £12 plus registration fees.

List of beneficiaries:

Charity Card: Association des Paralysés de France, Croix Rouge Française, Ordre de Malte, SNSM, UNAPEI, Ligue nationale contre le cancer, Institut Pasteur, Fondation pour la recherche médicale, les Petits Frères des Pauvres, Secours Catholique, Terre Fraternité.

Animal Card: SPA, 30 millions d'amis.

Nature Card: Fondation Sylvain Augier.

4.9. Carte Truffaut (Truffaut Card)

Programme carrier: **Truffaut**

Programme name: *Carte Truffaut (Truffaut Card)*

Location: France

<http://www.truffaut.com/services/carte-truffaut.html>

Type of programme: donations



What the programme consists of:

The Truffaut card is a loyalty and payment card. The loyalty section allows the holder to accumulate points according to purchase amounts (1 point per bracket of 7.60 euros). Supplementary bonus points can be regularly added depending on the purchases. Points are credited to an account which can be consulted online.

Cardholders receive certain benefits such as free passes for gardens and sites, reception invitations, and special days with discounts and gifts. Donations can also be made with the card. The card costs 8.50 euros.

Financial support:

Cardholders can choose to fund organizations in partnership with Truffaut (Perce-Neige, La Voix de l'Enfant, Animation Loisirs à l'Hopital). They can offer a certain amount of loyalty points which can be doubled by Truffaut.

4.10. KeyClub Bonus programme

Programme carrier: **USB**

Programme name: *KeyClub Bonus programme*

Location: Switzerland

http://www.ubs.com/1/e/ubs_ch/private/keyclub/offer/wwf.html

Type of programme: donations

The USB bank offers its clients the option of subscribing to the KeyClub Bonus programme which awards points for using the bank card, or for mortgages and assets. Clients have different choices for redeeming their points: for personal gain (trips, restaurants, shopping, etc.) or for charity. A partnership was formed with WWF Switzerland in order to support projects that protect the environment. Clients who wish to make donations must fill out a declaration form.

7. References

All Party Parliamentary Group on Peak Oil and Gas (House of Commons) and the Lean Economy connection (2009): "Tradable Energy Quotas (TEQs): a policy framework for peak oil and climate change", London.

Ang A. (2009): "Pelosi appeals for China's help on climate change", <http://www.speaker.gov/newsroom/articles?id=0237> (accessed 22 June 2010).

Authority of the House of Commons (2004): "Domestic Tradable Quotas (Carbon Emissions) Bill", The Stationery Office, London.

Bayrou F. (2006): « Réponse aux objectifs et propositions du Pacte écologique », http://www.pacte-ecologique-2007.org/html/details_candidats/details_bayrou.htm (accessed 24 June 2010).

BBC News (2005): "Personal carbon quotas considered", http://news.bbc.co.uk/2/hi/uk_news/politics/4645031.stm (accessed 24 June 2010).

Benn H. (2007): "The Environmental Revolution: How Green Politics can Renew Labour", <http://www.hilarybennmp.com/626b3f36-8df2-b714-0191-26c0814789c0?PageId=6362f95c-bc7b-bab4-6d7c-70e926100f08> (accessed 22 June 2010).

Bird J., Lockwood M. (2009): "Plan B? The prospects for personal carbon trading", Institute for Public Policy Research, London.

Blake A. (2008): "Country carbon rationing", First international conference on economic de-growth for ecological sustainability and social equity, Paris, <http://events.it-sudparis.eu/degrowthconference/appeal/Degrowth%20Conference%20-%20Proceedings.pdf> (accessed 22 June 2010).

Bottrill C. (2006): « Personal carbon trading: excluding public transportation », Working Paper, UKERC/WP/DR/2006/007, UK Energy Research Centre.

Bourg D. (2003): "Le défi climatique : les limites des politiques publiques », C.R. Geoscience, 335, p. 637-641.

Brohé A. (2008): "Personal Carbon Trading in perspective: potential pitfalls and compatibility with the EU ETS Framework", International Energy Agency Workshop, Paris.

Brown L.R. (2008): « Plan B 3.0. Mobilizing to save civilization », Earth policy institute, NY & London.

Bulteau J. (2009): "La mobilité durable en zone urbaine : efficacité et perspectives des politiques d'environnement », Thesis University of Nantes.

Castle (2006): "Secret plan to impose EU-wide carbon limit", The Independent, 24 nov. <http://www.independent.co.uk/news/business/news/secret-plan-to-impose-euwide-carbon-limit-425628.html> (accessed 22 June 2010).

Centre d'analyse stratégique (2009): "La régulation des émissions de gaz à effet de serre dans le domaine du transport », Note de veille n° 126.

Centre d'analyse stratégique (2010): « Les effets du Grenelle de l'environnement. La France doit-elle réduire ses émissions de gaz à effet de serre de 30% d'ici à 2020 ? », Note de veille n° 175.

Centre for Alternative Technology (2010): "Zero Carbon Britain 2030. A new energy strategy", UK.

Chamberlin S. (2009): "The transition timeline for a local, resilient future", Chelsea Green Publishing, Vermont.

China Climate Change Info (2008): "Britain Needs Personal Carbon Trading Scheme-MPs", <http://www.ccchina.gov.cn/en/NewsInfo.asp?NewsId=12443> (accessed 22 June 2010).

China Climate Change Info (2009): « China calls for a "low carbon" lifestyle nationwide », <http://www.ccchina.gov.cn/en/NewsInfo.asp?NewsId=17105> (accessed 22 June 2010).

Cochet Y. (2005): « Pétrole apocalypse », Fayard, Paris.

Cochet Y (2010) : « Le rationnement pour la paix, la solidarité et la démocratie », entretien pour Silence, *Villes en transition vers le rationnement*, n° 379.

- Cohen D. (2009) : « Sortie de crise. Vers l'émergence de nouveaux modèles de croissance ? », Centre d'Analyse Stratégique, Paris.
- Cohen M.J. (2010): « Is the UK preparing for « war » ? Military metaphors, personal carbon allowances, and consumption rationing in historical perspective », Climatic Change.
- Communiqué de presse (2009) : « Taxe carbone. L'alliance écologiste et son porte parole Francis Lalanne expliquent leur refus », <http://www.communique-de-presse-gratuit.com/blogs-et-sites-personnels/taxe-carbone-pourquoi-la-taxe-est-fustigee-par-alliance-ecologiste-independante/> (accessed 24 June 2010).
- Compston H., Bailey I. (2009): « The politics of climate policy in affluent democracies », Policy Network, London.
- Courrier de la planète (2004) : « Et maintenant ? », <http://www.courrierdelaplanete.org/72/article1.php> (accessed 22 June 2010).
- Criqui P., Faraco B., Grandjean A. (2009) : « Les Etats et le carbone », PUF, Paris.
- De Boissieu C. (2006): "Rapport du Groupe de travail 'Division par quatre des émissions de gaz à effet de serre de la France à l'horizon 2050'", MINEFI, MEDD.
- Defra (2008, a): « A report by the Department for Environment, Food and Rural Affairs : An assessment of the potential effectiveness and strategic fit of personal carbon trading », London.
- Defra (2008, b): "Synthesis report on the findings from Defra's pre-feasibility study into personal carbon trading", London.
- Department of Trade and Industry (2006): « The Energy Challenge. Energy Review Report 2006", Presented to Parliament by the Secretary of State for Trade and Industry, London.
- Desmesttre S. (2009): « La carte carbone: une alternative à la taxe? », Regards croisés sur l'économie, n° 6, p. 145-148.
- Enestam J.E. (2006): "Need for environmental globalisation", EEB Annual Conference, <http://www.environment.fi/default.asp?contentid=202334&lan=sv&clan=en> (accessed 22 June 2010).
- Environment Agency (2009): "Environment chief sets out vision for low carbon revolution within our lifetime", <http://www.environment-agency.gov.uk/news/113108.aspx> (accessed 22 June 2010).
- European Commission (2007): "Commission staff working document accompanying document to the proposal for a directive of the European Parliament and of the Council amending Directive 2003/87/EC so as to improve and extend the EU greenhouse gas emission allowance trading system".
- European Parliament (2008): « Citizens' Agora on climate change », http://forum.agora.europarl.europa.eu/jiveforums/servlet/JiveServlet/download/32-492-818-345/Final_Texts_ECONOMIE_EN_Final.pdf (accessed 22 June 2010).
- European Parliament (2005): "Winning the battle against global climate change", INI 2005/2049.
- European Parliament and Council (2009): "Decision 406/2009/EC on the effort of Member States to reduce their greenhouse gas emissions to meet the Community's greenhouse gas emission reduction commitments up to 2020".
- Fitz D. (2009), "Why energy efficiency isn't reducing consumption but how carbon rationing could", Synthesis / Regeneration, n°50, <http://www.greens.org/s-r/50/50-17.html> (accessed 24 June 2010).
- Fawcett T., Bottril C., Boardman B., Lye G. (2007): "Trialling Personal carbon allowances", UK Energy Research Centre Report, Oxford.
- Fleming D. (2007): "Energy and the Common purpose. Descending the energy staircase with tradable energy quotas", The Lean economy connection, 3rd edition, London.
- T. Fox et al. (2009): "Climate change. Have we lost the battle?", Institution of Mechanical Engineers, UK.
- Frew W. (2007): "Carbon credit debate gets personal", The Sydney Morning Herald, <http://www.smh.com.au/news/environment/carbon-credit-debate-gets-personal/2007/04/17/1176696838699.html> (accessed 22 June 2010).
- Goodall C. (2007): "How to live a low-carbon life. The individual's guide to stopping climate change", Earthscan, London.

- Government Office for Science (2010): « Foresight Land Use Futures Project », Final project report, London.
- Heinberg R. (2004): "Powerdown. Options and actions for a post-carbon world", New Society Publishers, Canada.
- Hillman M., Fawcett T. (2005): "Living in a low carbon world: the policy implications of rationing", Policy Studies Institute, UK Energy Research Centre.
- Hillman M., Fawcett T., Rajan S.C. (2008): "How we can save the planet. Preventing global climate catastrophe", Thomas Dunne Books, New York.
- Hopkins R. (2008): "The transition handbook. From oil dependency to local resilience", Chelsea Green Publishing, Vermont.
- House of Commons, Environmental Audit Committee (2008, a): "Personal carbon trading", Fifth report of Session 2007-08, The Stationery Office Limited, London.
- House of Commons, Environmental Audit Committee (2008, b): "Personal carbon trading. Government response to the Committee's fifth report of Session 2007-08", The Stationery Office Limited, London.
- Howell R. (2009): "The Experience of Carbon Rationing Action Groups: Implications for a Personal Carbon Allowances Policy", UK Energy Research Centre, Oxford.
- Hughes S. (2009): "Simon Hughes announces party consultation on personal carbon trading", <http://www.simonhughes.org.uk/pages/Partyconsultation.html> (accessed 22 June 2010).
- Hughes S. (2009): "IPPR – Personal Carbon Trading conference", http://www.simonhughes.org.uk/articles/000019/ipp_r_personal_carbon_trading_conference.html (accessed 22 June 2010).
- IPCC (2007): « Climate Change 2007. Impacts, Adaptation and Vulnerability », Contribution of Working Group II to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change, Cambridge University Press.
- IPCC (2007): "Climate Change 2007. Mitigation of Climate Change", Contribution of Working Group III to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change, Cambridge University Press.
- Keller F. (2009): « Oser la taxe carbone », http://fkeller.phpnet.org/taxecarbhone/?page_id=32 (accessed 22 June 2010).
- Kerr A., Battye W. (2008): « Personal carbon trading. Economic efficiency and interaction with other policies », RSA Carbon Limited and Green Alliance, London.
- Klosster J., Kampman B. (2006): "Dealing with transport emissions. An emission trading system for the transport sector, a viable solution?", Swedish environmental protection agency, report 5550.
- Lane C., Harris B., Roberts S. (2008): « An analysis of the technical feasibility and potential cost of a personal carbon trading scheme. A report to the Department for Environment, Food and Rural Affairs », Accenture & Centre for Sustainable Energy, London.
- Layet M. (2006): "Gaz à effet de serre: le Royaume-Uni veut faire des quotas d'émission une affaire personnelle", Cosmopolitiques, n°13.
- Lenglart F., Lesieur C., Pasquier J.L. (2010) : « Les émissions de CO2 du circuit économique en France », INSEE, SOeS/CGDD, Paris.
- L'Express (2006): "Le manifeste de L'Express pour préserver la planète », http://www.lexpress.fr/actualite/environnement/le-manifeste-de-l-express-pour-pr-eacute-server-la-plan-egrave-te_478971.html (accessed 22 June 2010).
- MayorWatch (2007): "Mayor calls for personal carbon allowances", <http://mayorwatch.co.uk/mayor-calls-for-personal-carbon-allowances/2007533> (accessed 22 June 2010).
- Miliband D. (2006): "The great stink: towards and environmental contract", <http://www.audit-commission.gov.uk/aboutus/annuallectures/pages/annuallecture2006.aspx> (accessed 22 June 2010).
- Mitchell W.J., Casalegno F. (2008): "Connected sustainable cities", MIT Mobile Experience Lab Publishing.

- Monbiot G. (2007): « Heat. How to stop the planet from burning », South End Press, Cambridge, Massachussets.
- Novatlantis (2005): « Vivre plus légèrement. Une nouvelle conception de nos ressources pour un développement durable: la société à 2000 watts », Suisse.
- Office of the Prime Minister of Malaysia (2007): "Regional Conference on Climate Change", http://www.pmo.gov.my/index.php?menu=speech&page=1677&news_id=114&speech_cat=11 (accessed 22 June 2010).
- Owen L., Edgar L., Prince S., Doble C. (2008): "Personal carbon trading: Public acceptability. A report to the Department for Environment, Food and Rural Affairs", Opinion Leader & Enviro Consulting, London.
- Parag Y. (2008): "The effect of carbon 'budget' on demand reduction: Personal Carbon Allowances, labelling and information", International Energy Agency Workshop, Paris.
- Parag Y., Strickland D. (2009): "Personal Carbon Budgeting: What people need to know, learn and have in order to manage and live within a carbon budget, and the policies that could support them?", UK Energy Research Centre, Working paper, UKERC/WP/DR/2009/014.
- Paterson M., Strippel J. (2007): "Governing individuals through the carbon market", Paper presented at the 4th ECPR general conference, Pisa.
- Perrels A., Hongisto M., Hyvönen K., Katajajuuri J.M., Nissinen A. (2009): "A quick scan of climate policy services and of underlying data systems approaches", Climate Bonus project report (WP 1), Government Institute for Economic Research, Helsinki.
- Perrels A., Nissinen A., Sahari A. (2009): « Reviewing key building blocks of an integrated carbon footprinting and consumers purchases' monitoring & reward system – interaction with the consumer », Climate Bonus project report (WP 4), Government Institute for Economic Research, Helsinki.
- Parliament UK (2009): "Personal carbon trading", Westminster Hall, <http://services.parliament.uk/hansard/commons/ByDate/20090618/westminsterhalldebates/part001.html> (accessed 22 June 2010)
- Plastrik P., Cleveland J. (2009): "Climate change, cities and the poor", Social space.
- Prime Minister's Office (2009): "Government foresight report on long-term climate and energy policy: towards a low-carbon Finland", Prime Minister's Office publications, Helsinki, n°30.
- Prescott M. (2008): "A persuasive climate. Personal trading and changing lifestyles", RSA, London.
- Rabobank Group (2009): « Annual Summary », http://www.rabobank.com/content/images/Annual_summary_2009_tcm43-103239.pdf (accessed 22 June 2010)
- Radanne P. (2005): « Energies de ton siècle! Des crises à la mutation », Lignes de repères, Paris.
- Raux C. (2005): « A system of tradable CO2 permits applied to fuel consumption by motorists », Transport policy, 12, p. 255-265.
- Raux C. (2007): "Les permis négociables dans le secteur des transports", Predit, La documentation française, Paris.
- Roberts S., Thumim J. (2006): "A rough guide to individual carbon trading. The ideas, the issues and the next steps", Report to Defra, London.
- Roodhouse M. (2007): "Rationing returns: a solution to global warming?", History and Policy papers, <http://www.historyandpolicy.org/papers/policy-paper-54.html> (accessed 24 June 2010).
- Rousseaux S. (2009): "Etat des lieux international des programmes de 'carte carbone' pour les particuliers (Europe et Etats-Unis)", Report for ADEME, <http://hal.archives-ouvertes.fr/hal-00368067/fr>
- Rousseaux S., Ochoa N., Foucher K. (2010) : « Enjeux juridiques du contrôle des émissions personnelles de gaz à effet de serre par un dispositif de carte carbone », Développement Durable et Territoires, forthcoming.
- Schoune C. (2007): « Oui au quota de carbone familial ! », Le Soir, <http://blogs.lesoir.be/empreinte-eco/2007/04/02/oui-au-quota-de-carbone-familial> (accessed 22 June 2010).

Semal L., Szuba M. (2010) : « Villes en transition vers le rationnement », Silence, n°379.

Seyfang G. (2006): "Community Currencies: A New Tool for Sustainable Consumption?", CSERGE Working Paper, EDM 06-09, University of East Anglia, Norwich.

Seyfang G., Lorenzoni I., Nye M. (2009): « Personal Carbon Trading: a critical examination of proposals for the UK », Tyndall Centre for Climate Change Research, Working paper 136.

Spratt D. (2007): "Climate advocacy and the 2007 election", Carbon Equity, Australia, <http://www.carbonequity.info/docs/election07.html> (accessed 22 June 2010).

Starkey R. (2008): "Allocating emission rights: are equal shares, fair shares ?", Working paper 118, University of Manchester, Tyndall Centre for Climate Change Research.

Starkey R., Anderson K. (2005): "Domestic Tradable Quotas: A policy instrument for reducing greenhouse gas emissions from energy use", Technical report 39, Tyndall Centre for Climate Change Research.

Stevenson S. (2005): "The future is green", http://www.rse.org.uk/enquiries/energy/evidence/Stevenson_MEP.pdf (accessed 22 June 2010).

Stevenson S. (2006): "Facing the truth: EU energy policy in the age of shortage of supply", <http://www.epp-ed.eu/Press/pdoc06/060918stevenson-speech.doc> (accessed 22 June 2010).

Stevenson S. (2009): "Give everyone a carbon card", http://www.struanstevenson.com/media/article/give_everyone_a_carbon_card/ (accessed 22 June 2010).

Sustainable Consumption Institute (2009): « Consumers, business and climate change », University of Manchester.

Szuba M. (2009) : « Le rationnement pour changer les modes de vie ? Le cas du projet de 'carte carbone' en Grande-Bretagne », in Dobré M, Juan S., *Consommer autrement. La réforme écologique des modes de vie*, L'Harmattan, Paris.

Tesco (2010): « Corporate Responsibility Report », <http://www.tesco.com/cr2010> (accessed 22 June 2010).

Theys J. (2009): « Vers des villes post-carbone. Six sentiers de transition », Horizons 2030-2050, n° 2, Commissariat général au développement durable, MEEDDM, Paris.

Thumim J., White V. (2008): "Distributional impacts of personal carbon trading: A report to the Department for Environment, Food and Rural Affairs", Centre for Sustainable Energy, Bristol.

Thumim J., White V. (2009): "Moderating the distributional impacts of personal carbon trading", Centre for Sustainable Energy, Bristol.

UK Energy Centre Research (2008): «Personal Carbon Trading (PCT): Bringing together the research community», Workshop Report, UKERC/MR/MP/2009/001.

Usine Nouvelle (2006): "Elysée 2007. Lepage: des crédits CO2 individuels" <http://www.usinenouvelle.com/article/elysee-2007lepage-des-credits-co2-individuels.N54183> (accessed 22 June 2010).

United Nations Environment Programme (2008): « Kick the habit. A UN guide to climate neutrality », Malta.

Wintour P., Stratton A. (2008): "Ed Miliband : no retreat from green agenda despite recession", The Guardian, <http://www.guardian.co.uk/politics/2008/oct/15/greenpolitics-energy> (accessed 22 June 2010).

World Trade Organisation, United Nations Environment Programme (2009): « Trade and Climate change », Geneva.

Wyatt D. (2007): "Former Environment Minister leads charge", http://www.derekwytatxmp.co.uk/news_item.aspx?i_PageID=115287 (accessed 22 June 2010)

